ELECTRICAL REVIEW

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VIEWS, NEWS AND INTERVIEWS.

A prominent electrical official of New York, who met Hon. M. A. Hanna at the Union Club, Cleveland, shortly after the election of President McKinley, replied to the inquiry of the distinguished Republican chairman that he desired only one thing, and that was, that Mr. Hanna would always recognize him. Mr. Hanna jocularly remarked that he was "getting off easy." The next day at the same club Mr. Hanna noticed his new acquaintance lunching at a table in another part of the room, and remembering his request and also impressed by his pronounced auburn type, called out, "Hello, my strawberry blonde, how are you today?" The visitor was able to say that he was "quite well, thank you," while everybody gazed in astonishment at the stranger who was so well known to the great politician. He afterwards expressed his firm belief that Mr. Hanna was undoubtedly a gentleman whose promises could be relied on.

Mr Andrew Carnegie has been elected a member and vice-president of the Board of Trustees of Stevens Institute of Technology, Hoboken, N. J. The gift of $50,000 recently made to the institute by Mr Carnegie for the building of a new engineering laboratory has been accepted, and a vote of thanks tendered to the donor.

Every one electrical knows the completeness of the equipment of Mr. Edison's famous laboratory at Orange, N. J. "I want to be prepared for any emergency," Mr. Edison is quoted as saying. "I don't want a million-dollar idea to go to waste while I am sending to town for ten cents' worth of material from the village store." When the laboratory was stocked, Mr. Edison thought he would test its completeness, says the *Saturday Evening Post*. Therefore he offered a prize of ten dollars to any of his assistants who should mention any material of possible use not contained in the collection. The prize was won by a bright young man after a hard day's work. And the missing article was a clothes-pin.

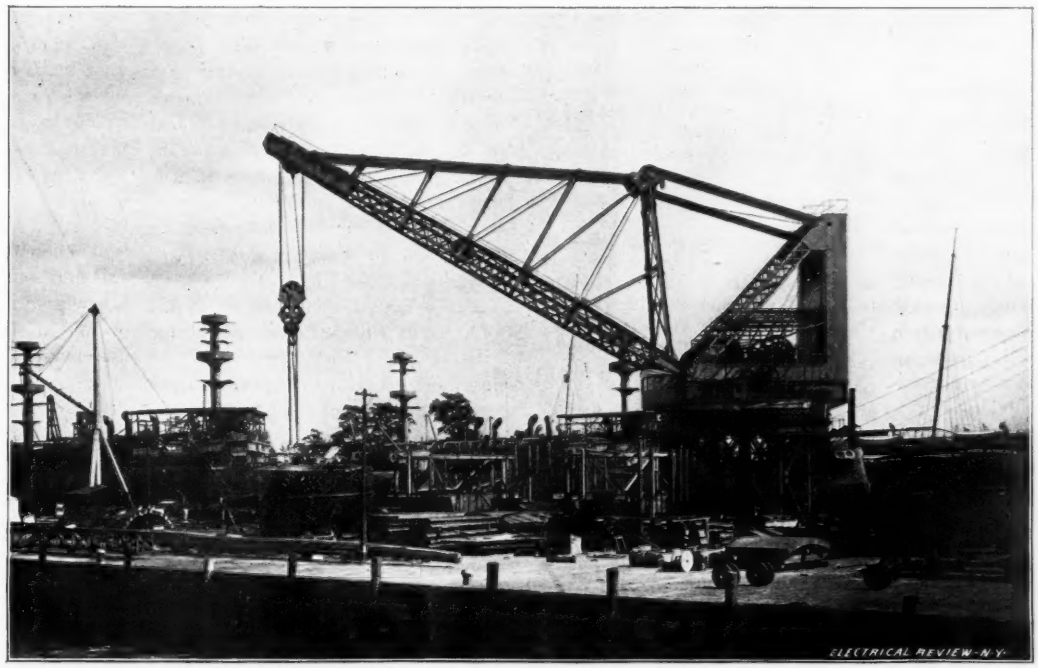
"Count" John K. Van Ness, of Plainfield, N. J., gave the Plainfield & Scotch Plains trolley line a specified right of way across his place. The railway company changed the location of its line, which incensed the "Count." So he erected a shanty on his grounds, where he and two hired men stand guard every night to prevent the trolley people from laying the track. During the day the "Count" stands watch behind earthworks, which he has thrown up, and which are defended by an 18-inch—length—brass saluting cannon. He declares he will hold the fort to the last.

A newspaper cablegram from Sebastopol says that a Cossack ex-officer, who has just returned from Teheran, Persia, declares that the Shah is mentally and physically incapacitated, and that he suffers hallucinations. He finds his chief amusement with telephones, which are installed throughout the palace. We may now expect the usual crop of remarks from the joke writers.

President H. H. Vreeland, of the Metropolitan Street Railway Company, of New York city, expects that the company's new power station will be finished in the Autumn. It will have a capacity of 70,000 horse-power, and will supply current to the company's entire system.

An Electrically Operated 150-Ton Revolving Derrick.

The ELECTRICAL REVIEW publishes herewith, through the courtesy of Mr. W. A. Post, general superintendent of the Newport News Shipbuilding and Dry-Dock Company, Newport News, Va., a half-tone illustration of the electrically operated 150-ton revolving derrick, which has been designed and constructed by the company and erected in their shipbuilding yard for convenience in handling the heavy weights installed on board ship during the fitting out period. Some months ago, Mr. Post gave full particulars of this derrick in an interesting paper, read before the Society of Naval Architects and Marine Engineers, and this is the source of the following information:



AN ELECTRICALLY OPERATED 150-TON REVOLVING DERRICK AT THE NEWPORT NEWS SHIPBUILDING AND DRY-DOCK COMPANY'S PLANT. (From a Copyrighted Photograph by Rusk & Shaw, Newport News, Va.)

The derrick is electrically operated and controlled and mounted on a steel tower supported in turn by pile foundations. The structure is located on one side of a pier 700 feet long, forming one side of a slip, in which a number of ships may be moored at one time and readily brought within the field of the derrick's operation. Two standard gauge tracks over the entire length of pier afford means of transportation from any part of the yard. The floor of the pier, 185 feet in width, furnishes ample room for the temporary reception of heavy pieces, castings, armor, etc., and permits, in addition, the assembling of much work within direct reach of the derrick, thus allowing assembled parts to be placed on board as a single member, relieving the tendency to overcrowd

floor space in the shops and effecting a saving in cost over work as assembled on board ship.

The derrick jib is capable of having its outer end raised or lowered, thus giving to the hoisting blocks, which depend vertically from this end, a movement not only of rotation about the center of the derrick, but also of translation in or out from this center. With the outer end of the jib in its lowest position the hoisting blocks will, on rotation of the derrick, describe the circumference of a circle 207 feet in diameter; with the jib in its highest position these blocks, on rotation, describe the circumference of another concentric circle 88 feet in diameter, thus permitting the derrick to operate on weights lying anywhere within the circular ring whose maximum and minimum diameters are 207 feet and 88 feet, respectively. The maximum load of 150 tons can be handled only within a ring whose maximum and minimum diameters are 147 feet and 88 feet, respectively, but weights up to 70 tons may be handled throughout the entire field of operation.

The derrick is revolved by duplicate sets of machinery, each consisting of one No. 800 General Electric railway motor, capable of developing 20 horse-power, and driving, through means of a double-threaded worm and wheel of the Albro-Hindley pattern, a pinion which, engaging a horizontal circular rack on the outside of the tower, gives the required movement of rotation. The motors are series wound, and controlled from a series parallel controller, giving high efficiency under starting conditions, as well as at normal speed.

The racking movement of the jib is effected as follows: At the inner and upper apex of the jib is a 10-inch steel pin carrying twenty-two cast-steel sheaves, each sheave of five-foot pitch diameter. At the upper apex of the housing is another 10-inch steel pin carrying 24 similar sheaves. Leading over these two sets of sheaves, and sustaining the weight of the jib and the load, are two one-and-one-quarter-inch steel wire ropes, each rope being wound on alternate sheaves, and each end of the rope brought down to separate drums located below in the housing, this arrangement insuring freedom from side-twisting on the sheaves, and also requiring each rope to take its share of the weight. The four drums, on which these ropes are wound, are arranged in pairs, each one of a pair taking opposite ends of the same rope, and each pair driven by a No. 2,000 General Electric series motor of 100 horse-power, the power from the motor being transmitted to each drum through a separate train of gears.

There are two main hoists, each of 75 tons capacity, and one 20-ton whip for lighter loads. The main hoists are each of 12 parts, one and one-fourth-inch steel wire rope, leading over six sheaves, five-foot pitch diameter, carried on a 10-inch steel pin at the outer end of the jib. The lead from these sheaves to the operating drum is carried down the jib on wooden roller runners. These drums, one for each hoist, are of cast-iron, eight and one-half-foot pitch diameter, carried on seven-inch steel shaft, and each driven, through a train of gears, by a No. 2,000 General Electric 100-horse-power motor, series wound. These hoists may be coupled together and operated as one hoist of 150 tons capacity. The 20-ton whip is of three parts, one and one fourth-inch steel wire rope, carrying a single block, and leading over two sheaves, carried, as are those for the main hoist, at the outer end of jib. The lead from these sheaves passes down the jib, over a single guide sheave, to a cast-iron drum, five-foot pitch diameter, driven, through a train of gears, by a No. 2,000 General Electric 100-horse-power motor, series wound.

It will be noticed that electricity is used to generate the power required for all the movements of the derrick. Current is transmitted over heavy insulated copper wire, to fixed brushes, attached at the center and near the top of the steel tower. These brushes are arranged to bear against circular contact rings insulated from, but carried by, the center casting, to which the roller ends are secured. Near the top of this casting are two more contact rings, which transmit the current to a pair of brushes, fixed to the revolving part of the derrick, from which the current is delivered over heavy insulated copper wire to the several motors. The current is delivered to the motors, under normal conditions, at a pressure of 220 volts.

The operating station is situated directly underneath the lower end of the jib, overlooking directly the weights to be handled, and encased with a glass front as a protection from the weather. The controllers for the several motors are within easy reach of a single operator, who is thus given convenient and absolute control over the varied movements of the derrick. The ropes for the hoist and racking movement are all of plough-steel wire, one and one-fourth-inch in diameter, of six strands of 37 wires each, with hemp center, and very flexible. Each rope has a breaking strength of 100,000 pounds. The gears throughout, except the worms and those supplied with the motors, are of cast-steel with cast teeth, the pinions being fully shrouded. These gears work very smoothly and show a high efficiency.

THE FILMS THAT FAILED.

EMERGENCY EXPERIENCES IN TRYING TO ELECTRICALLY ILLUMINATE A PRIZE FIGHT.

On Friday, June 9, at the building of the Coney Island Athletic Club, there was attempted a solution of an electical and photographic problem, which, had it succeeded, would have resulted in successful kinetoscope films of the big prize-fight, in which Robert Fitzsimmons and James Jeffries were the principals.

The light conditions to be obtained were the illumination of a platform about 24 feet square, to such an intensity as to permit successful instantaneous photography of any objects or persons standing upon it.

It was essentially a hurry-up job. A great deal of money was spent in making haste, and if so much haste had not been necessary there might have been more light. The lamps were 24 in number, and were supposed to consume from 50 to 80 amperes each at 80 volts. This current load it was found impossible to obtain either from the local lighting or railway circuits, and the immediate erection of a temporary plant, rheostats and systems of wiring was necessary; whereby hangs a tale.

The boiler of this installation was an upright tubular affair standing, with its short stack, some 30 feet high, and which, in its gaunt uncovered condition, looked as if it might have been resurrected from some sawmill. Indeed, the local boiler inspector seemed to think so, for rumor has it that he objected to certain features of its construction, and declined to permit it to be used, and it is also said that this difficulty was gotten over by the simple device of passing both the inspector and the boiler. Certain it is that about 12 o'clock on the day of the contest steam was up in the boiler and hissing ominously out of the safety valve.

The engine which this boiler supplied was a bulky, single cylinder, Corliss type, and was mounted on a not too secure foundation of a few railway ties imbedded in the sand. The exhaust was piped off to a sufficient distance so as not to annoy the engineer, that being the only requisite which the occasion demanded.

When the engine was revolving at full speed there was a decided sense of insecurity, as it rocked and swayed, and there was every prospect of the fly-wheel suddenly finding the bottom of the pit which had been excavated for it, in which case engine and boiler would have undoubtedly constituted a very energetic and destructive merry-go-round, surpassing anything that has been seen, even on Coney Island. A long belt connected the engine with a generator which apparently was capable of developing as much as 150 kilowatts and rated at a pressure of 220 volts. A few beams driven into the ground, with two or three cross-beams, supported an ammeter and voltmeter and a telephone connected with the lamp platform, and a canvas roof, stretched upon posts stuck in the sand, housed the installation.

One of the leads of the dynamo was sent directly to the arc lamps and became a common positive for them all. The negative wire was split up into 24 sections, each passing through a rheostat on its way to the individual lamp that it supplied. The rheostats were of the liquid type, and here local conveniences were utilized, for each rheostat consisted of a substantial beer barrel in which were immersed two metal plates, the barrel being filled with water to which a suitable modicum of salt was added. The arc lamps themselves were supported on a square platform surrounding the ringside and some 30 feet above its level. Each lamp was mounted on the floor of this platform and its beams were directed on the floor of the ring. The lamps consisted of a sheet-iron reflector on the back of which were mounted stout oak bars. The whole was pivoted at its lower end on a universal joint. Short projections from either end of the wooden bar accommodated a brass carbon holder adapted to carry an inch carbon. The upper carbon holder was provided with a rack attachment enabling the carbon to be fed down as occasion required or to be manipulated for the purpose of striking the arc, which occasion required much more frequently. Poised on thin supports the lamps looked over the edge of the platform like 24 interested and animated coal hods mounted on nodding stems. A switch and fuse-block completed the equipment of each lamp. Some of the switches of these lamps were capable of carrying fully 300 amperes and others were closely allied to the "baby"-knife class. Altogether it was as heterogeneous a collection as might be imagined. There were quick breaks, slow breaks and those that didn't break at all. The lamp circuits themselves were connected in many cases with wire equivalent to perhaps No. 12, and the

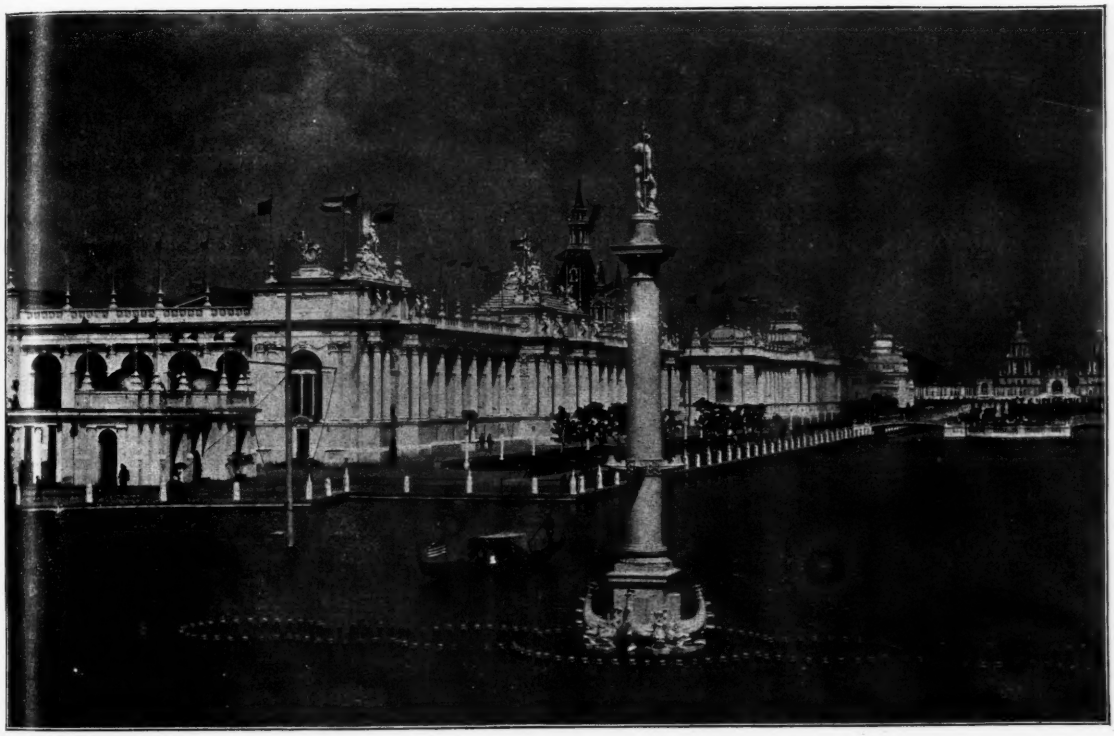
fuse-blocks protecting them were found to contain short and very healthy looking pieces of No. 10 copper wire. As far as can be learned none of these fuses ever blew; they would doubtless have been a very permanent part of the installation had it not been that the management decided that it was better to remove them and replace them with fuse wire.

Some hours before the fight the plant was started up and each arc lamp was adjusted singly, telephone communication being had between the arc-lamp platform and the dynamo. The operator adjusted the carbons and called for more salt in the rheostats until the light was "about right," and the lamp was then extinguished and the next one adjusted in the same way. Each lamp operated alone gave a magnificent illumination and seemed to flood the ring with light, and it was fondly hoped that if each light proved thus satisfactory they would operate simultaneously with equal effectiveness. They were mostly adjusted for 60 amperes. Now, 60 times 24 is 1,440, and if the machine had this ampere capacity its total necessary watt output at 220 volts would be 317 kilowatts, a very fair over-load for a machine of apparently 150-kilowatt capacity at the very most. It seemed quite safe to predict its early decline and fall when the total lamp-load was called for.

And so indeed it proved. When the principals in the contest appeared and took their chairs in the respective corners, everyone was ordered to light up, but the success was by no means as general as the order. Perhaps 12 of the 24 lights lighted. The rest gave interesting little flashes and would not hold a permanent arc in spite of the utmost ingenuity in manipulating the adjusting screws.

While the operators were endeavoring to get their lamps started, the engine outside was laboring heavily; the piston was leaky and it could not develop anything like its full horsepower, and at any suggestion of a demand for current in the dynamo the entire plant slowed down. Finally, the likeliest looking lamps which had the saltiest rheostats were picked out to operate, and the others were turned out The light was perhaps equal to about four of the lamps burning as they should have burned, and the kinetoscope films developed out innocent of any marks that would suggest a negative. Subsequent manipulation of the circuits after the big fight was over, showed that the device of placing two of the lamps in series had a very beneficial result, and transferred some of the energy which was being consumed in the barrels on the outside of the building to the arcs within the reflectors, and subsequent unimportant bouts occurring on succeeding evenings were very efficiently lighted. The entire essay seemed to demonstrate that even in a hastily constructed plant where economy is no consideration it is well to make a few little engineering calculations as, for instance, those which compare the capacity of the machinery with the load that it is to carry, and it also demonstrates the advisability of preliminary trial before risking an installation on an important venture. The actual money lost in this attempt could not have been far short of $5,000, and it is easily possible that the kinetoscope films had they been successful might have realized $100,000.

Ample excuse for the projectors of the enterprise may be found in the lack of time, which, when it is taken into consideration, makes it surprising that any plant at all was erected; its subsequent successful performance when it was not needed is only a sad reminder of what might have been, although it demonstrates that, had there been time to properly install and connect the equipment, unqualified success was certain.



The Agricultural Building and Electrical Fountain at the Greater America Exposition, Omaha.

The transfer of the Virginia Electric Company's plant which supplies electric light and power to the city of Norfolk, Va., to the Williams syndicate for $700,000 gives the syndicate absolute control of all existing electric power and lighting plants in Norfolk and vicinity. Further enlargement is contemplated.

Electrical Features at The Greater America Exposition, Omaha.

The electrical features of the first Greater America Colonial Exposition, to be held in Omaha this year from July 1 to November 1, promise already to maintain the high standard set in the West for night illumination. Those who last year witnessed the marvelous decorative lighting nightly accomplished in the Grand Court of the Trans-Mississippi Exposition were charmed by the scene presented, and even those who had vividly in memory the results attained at the World's Fair at Chicago, were eager to acknowledge this a gem in its beauty. Yet superlatives only exist through comparison, and just as this portion of the conception at Chicago retired before comparison with Omaha's Exposition, so again must the Trans-Mississippi retire in comparison with the lighting planned for the Greater America. It is not intended that the results are to be attained by simply increasing the quantity of light, though a fair increase has made it possible to develop advantageously some points prohibited last year. It is intended to bring the many beautiful sculptured details out into clear relief, to illuminate the many new flower beds, and to make the group of buildings on the Bluff Tract a friendly rival for admiration with the Grand Court itself.

Work has been progressing in the electrical department most rapidly under the superintendency of Mr. Henry Rustin, who, it will be remembered, had charge in a similar capacity last year. In order to realize how much has been done it must be understood that the wiring and plant of the Trans-Mississippi Exposition were entirely dismantled and put in store. At the present time all the machinery is being put in place. The generators are furnished by the General Electric Company, of Schenectady, as well as the apparatus for transforming the current, and the motors for power service in the Machinery and Electricity buildings by another firm. The engine service is furnished by the Westinghouse, Ball, McIntosh & Seymour, and Atlas engine companies. The underground wiring, which is by no means small in extent, will be furnished by the Safety Insulated Wire and Cable Company, of New York.

All of the wires, as well as the lamp receptacles on the buildings in and around the Grand Court, are in place and ready to be lamped up for a test. No ordinary obstacle can intervene to prevent the lighting this year being all that is hoped for, bewitching to the visitor who sees it for the first time and entrancing to the nightly attendant.

SCIENCE BREVITIES.

The Corrosion of Alloys in Sea Water—A recent issue of *Stahl und Eisen* gives an abstract of some interesting and exhaustive tests which have been conducted by the German Admiralty with a view to determine the relative corrosion of various metals and alloys when submitted to the action of sea water. The tests extended over a period of more than two years, and, as might have been expected, says the *Mechanical World*, were very thoroughly conducted. The harbor of Kiel was the scene of the experiments, the specimens being suspended in the sea water and exposed to conditions of actual practice. Twelve strips were cut from each metal experimented with, nine being immersed in the water and three retained for comparison. At intervals of eight months three of the immersed strips were taken out of the water and broken in a testing machine, as was one of the reserved pieces. Tests were made with immersions of 8, 16 and 24 months and some after 32 months' immersion. As the atmosphere is known to have an injurious effect upon alloys containing much zinc, specimen alloys were also exposed to free contact with the air in order that the loss of strength from this cause might be determined.

The trials were limited to such alloys as are actually used in shipbuilding, and included in the following five groups, viz., copper alloys rich in zinc, bronzes containing little zinc, pure tin bronzes, pure aluminum bronze and iron aluminum bronzes.

The following were the general conclusions deduced from a comparison of the various tests:

"First, as regards the behavior of specimens exposed to atmospheric influence only. It was found that for this purpose the iron bronze alloys stood remarkably well, there being practically no deterioration during the two years. Those alloys, however, which contain much zinc do not behave so well, but no tests were made as to the resistance of the iron-zinc bronzes to the action of the air.

"When immersed in sea water in contact with iron, the iron, tin and aluminum bronzes all retained their strength very well. After exposure to the water for two or two and one-half years there was no marked difference in appearance, nor was there any reduction in weight, while tension tests showed no reduction in strength. Iron bronzes in contact with tin bronze showed a material loss after exposure to sea water, the zinc dissolving out, but this action was less rapid with the aluminum bronzes. A specimen of iron bronze in contact with the bronze after two years' immersion in sea water showed a loss of two-thirds of its original strength and four-fifths of its extensibility, and the structure was partially destroyed by the eating away of the zinc. Cast and wrought bronzes appeared to be equally affected. A wrought plate of iron bronze in contact with a cast plate of the same material was rapidly affected, and in two years its strength was diminished by about 60 per cent. An iron bronze and a phosphor bronze, attached to a piece of oak, showed a slow corrosion of the iron bronze, 20 per cent of its strength being lost in 23 months.

"The important conclusion which was drawn from the experiments was that the metal to which the sheathing is attached exerts considerable influence. Thus, for instance, tin and iron bronze both give good results in contact with iron, but are injuriously affected in contact with each other, while the iron itself is least corroded when sheathed with an iron bronze.

"The principle which governs the corrosive action between different metals is apparently their relative position in the electrical scale, and the same considerations which govern the choice of metals for galvanic action enter into the question of injurious corrosion. Pure aluminum bronze, for example, resists the action of sea water remarkably well when in contact with metals which are electro-negative towards it, while contact with electro-positive metals causes its rapid destruction.

"It is therefore most desirable to place those metals in contact which are close to each other in the electrical scale, and statements as to the relative resistance of an alloy or sheathing metal to corrosion is quite misleading, unless it includes a description of the material with which it is to be used."

Inclination of the Earth's Magnetic Field in Ancient Times—In a note in this department in the last number of the ELECTRICAL REVIEW an account was given of the work of Signor Folgheraiter upon the inclination of the earth's magnetic axis in ancient times, as exhibited by clay vases and other objects found in old tombs. The author has just published, in the proceedings of the Accademia Lincei, the result of his researches made upon a large number of antique objects. Vases from Arezzo and Pompeii, belonging to the first century B. C., showed that at that time the magnetic inclination in Arezzo was northerly, as now, and had a value of about 61.3 degrees. This is about the same as the present value of the inclination in the same locality. Pompeian vases showed an inclination, in the first and second centuries B. C., of 66.5 degrees in that place. It appears from the Arezzo vases that the variation in inclination at that point in a century and a half was about eight degrees. Measurements made at Paris since 1671 have shown a diminution of 10 degrees in the inclination there in two and one fourth centuries. It was not found possible to reach any conclusions about the intensity of the earth's magnetic field at that time. Further experiments made upon Greek vases of the familiar pattern—red figures on a black ground or black figures on a red ground—taken from the museums of Florence and Syracuse showed that during the fifth, sixth and seventh centuries B. C. the magnetic inclination in Greece was almost nothing. Toward the end of the period of the manufacture of these vases (that is, about 400 B. C.), the inclination in the Greek peninsula had begun to increase, and reached a value of about 20 degrees north.

Sterilizing Potable Water by Ozone—In a communication to the Académie des Sciences, MM. Marmier and Abraham describe an experiment on an industrial scale, recently made at Lille, France, for the sterilization of water by means of ozone. The electrical pressure used in the ozone generator was 30,000 volts, a Hertz ozonizer being used. The generators were cooled by water circulation, the water dropping into the circulating tubes to insure their insulation.

Coming out of the generator the ozone was led into a hollow masonry column where it encountered the water to be acted upon. This had been filtered beforehand to remove the grosser impurities in suspension.

After several months of operation the issuing water was analyzed by an expert commission of chemists and bacteriologists, who reported as follows: "All the pathogenic microbes, or saprophytes, in the water analyzed by us were entirely destroyed by the ozone treatment. The only germs resisting its application were those of *Bacillus Subtilis*. The treatment adds no element to the water prejudicial to the health of those who use it, but on the contrary, by its considerable diminution of the organic contents, makes the water less subject to ulterior pollution."

Radiation of Luminous Paint—Balmain's luminous paint has certain curious actinic properties which differentiate it from other luminescent bodies emitting Le Bon's "dark light." In a preliminary report abstracted in the *Electrician*, L. Kann describes how he exposed a screen of that paint to sunlight, and then laid it on a sensitive plate, inserting various substances, such as paper, cardboard, wood and aluminum between the plate and the luminous screen. The most curious observation is that printed letters on a card were photographed even through a sheet of aluminum, and that impressions were obtained apparently without the special treatment by which Le Bon sensitizes his plates for obscure radiation. That some form of dark radiation is at work is shown by the fact that essentially the same results are obtained long after the screen has ceased to be luminous. The vapors of the interposed substances are certainly not responsible for the impression on the sensitive plate, since on removing the luminous screen and leaving the substances in contact with the plate for five days no impression is obtained. The active rays, whatever they are, penetrate white paper more rapidly than black paper. It was, indeed, found possible to print on the photographic plate very plainly within half-a-minute the name on a visiting card enclosed in a very heavy envelope.

A New Type of Coherer—In a paper before the Académie des Sciences, M. T. Tommasina states that a very sensitive coherer may be constructed by enclosing a drop of mercury in a glass tube between two cylindrical brass electrodes. This fact led him to investigate the properties of liquids with reference to electro-magnetic waves. For this purpose he immersed a copper disk and a pendulum bob in distilled water. Both conductors had previously been coated with a film of electrolytic copper and well washed. On passing a current through the two electrodes, a black deposit was formed on the disk, which grew until a chain of particles, probably cupric oxide, joined the two electrodes. On increasing the distance between them, the current was not interrupted, but the chain grew until it again united both electrodes, even when three centimetres apart. The chain followed the pendulum bob on displacing the latter to the right or to the left The chain is sometimes invisible. If a small incandescent lamp is inserted in the circuit, and the bob suddenly removed to three centimetres, the lamp remains alight even before a visible chain is formed. When the distance between the electrodes is very small, a chain may be formed simply by the action of electro-magnetic waves, and the author has constructed a coherer on that principle, with a very thin layer of distilled water.

Whitening a Negro by Electricity.

There is no telling what the newspapers will claim for electricity next. The following amusing story is due to the Omaha *Bee:*

"The *Fremdenblatt* of Vienna reports the case of a 'white negro' resident of the Austrian capital, whose singular transformation from a colored into a white, or, rather, whitened person, has created a sensation among the public of the old Kaiserstadt, and is being studied with increasing interest by the scientists of its university. The question seems to be whether this extraordinary phenomenon is merely a 'freak or nature' or may furnish the basis for future experiments in 'white-washing,' as it were, black-skinned individuals by an electric treatment, whose boundless applicability bids fair to afford hopes for the gradual whitening of whole peoples, like our colored natives and colonial fellow citizens, Filipinos, Hawaiians, not to mention Samoans, etc. All that is necessary would be the establishment of electrical plants of sufficient capacity and power to provide whole negro communities with the needed electric baths. We refrain from expatiating on the anthropological and political vistas thus opened by the accidental discovery of a Viennese physician, but hasten to state the recorded 'miracle,' for such it appears to be, according to the *Fremdenblatt.* Two years ago an Austrian merchant, who had been on a business trip to Africa, brought back with him from Egypt Ibual Lacho, a Soudanese negro, aged 19 years. Speedily acclimated, the black immigrant soon learned the German dialect of the Viennese and surprised them by his clever manners and the elegant dress he displayed in the cafes and upon the 'promenade.' During last autumn he became affected by nervous troubles, which a famous neuropathist of Vienna subjected to electrical treatment. Ibual Lacho's condition began to improve from day to day and, strange to relate, in the same proportion as the disease seemed to leave him there disappeared the black dye of the skin. Paler and paler he grew until, through the stages of Peruvian and Egyptian mummy coloration and the pallid tinge of embalmed beef, he blanched into gaining the true Caucasian complexion. Ibual's doctor explains the discoloration of his patient from a process by which the black pigment in his skin was disintegrated and finally eliminated through electricity. This chief coloring matter, melanin, or pigmentum nigrum, found in the eye, the hair and the skin, contains iron, and strongly reacts upon electric application. The hope is expressed that the United States government, which, together with the most successful white-washing institution it already possesses, boasts of the largest negro constituency among all civilized nations on the globe, will not delay giving its attention and further exploitation to the Viennese physician's miraculous experiment. It might solve the race problem, stop lynching and secure for another generation the negro's vote."

The Latest and Largest Statue of Benjamin Franklin.

It has been for almost a century a reproach to Philadelphia that Benjamin Franklin, the citizen most identified with the historic glory of the place, has been without a distinct monument. In that city of his scientific and literary triumphs are many institutions associated with his memory. At least two minor statues have been erected to him, one on the Ledger Building and the other on the Philadelphia Library, which he founded. At a dinner given in Philadelphia a few years ago, the absence of a conspicuous and costly public monument to Franklin was incidentally touched upon, when Mr. Justus C. Strawbridge resolved to remove the stain from the city's name. He gave an order, *carte blanche,* to the distinguished Philadelphia sculptor, Mr. John J. Boyle, the consummation of whose work is indeed gratifying. The statue, well shown in the illustration, was unveiled on June 14.

THE STATUE OF BENJAMIN FRANKLIN. UNVEILED IN PHILADELPHIA ON JUNE 14.

Most appropriately, this statue stands in front of the post office, where it will forever be linked with that branch of the government service of which Franklin was the first head and the chief promoter. Most appropriately, too, the officers and the students of the University of Pennsylvania played a prominent part in the celebration, for it was to Franklin that this institution owed its life and its first beginnings.

The achievements of Franklin, patriot, printer, editor, diplomat, publicist, statesman and natural philosopher, were of the most remarkable of the great times with which he was identified. Emerging, as he did, from the people and establishing himself, by his own efforts, as printer and publisher, he became in turn statesman and diplomat—a friend of one king and the successful antagonist of another. In the intervals of the labors, which were of such value to his country and to the diffusion of the idea of liberty, he found time to make the experiments and draw the deductions that have given him first rank among the electrical theorists of his time. It is indeed fitting that in Philadelphia, the city of his adoption, and upon the very site of his famous kite-flying experiment, a proper monument has, at last, been erected to commemorate this man who "snatched the lightning from the heavens and the sceptre from the tyrants."

OBITUARY.

Charles B. Thurston, a prominent resident of Jersey City, died on June 14 at his home. Mr. Thurston was 67 years old. He was born in New York city on April 2, 1832. Mr. Thurston was a special agent of the Pennsylvania Railroad Company, president of the Jersey City & Bergen Railroad Company, the Port Richmond & Bergen Point Ferry Company, the Millstone & New Brunswick Railroad Company, the Fayetteville Water, Light and Power Company, of North Carolina, and was a director in a number of other corporations.

The American Bell Telephone Company is inviting proposals to purchase $2,000,000 additional 10-year 4's, currency debentures, the sales to close June 22, and the money to be paid July 1. These are part of an authorized issue of $10,000,000, of which $8,000,000 are outstanding.

Electric Railways in Germany.

In 1891 only three German cities had electric railways. At the end 1898, however, 68 cities were so equipped, while in 35 other cities electric railways were being constructed, or were provided for. The entire length of such roads in Germany at the end of 1898 was 888 miles, with 1,205 miles of track, 3,190 motor cars and 2,128 trailers. The length of new line then under construction, or about to be commenced, was 677 miles, with 830 miles of trackage. The electric street railway of Hanover, one of the first lines and now one of the best systems, was built by an American engineer, and was opened on May 1, 1892. The cars are American in type, and the heavy steel rails are laid on concrete. The speed is about eight miles per hour; within the city, in some places, the accumulator system is used; outside and in the outskirts the overhead trolley is employed. The track is now over 105 miles in length, with 41 overhead trolley cars, 161 accumulators and trolleys combined, 167 trailers, 20 locomotives, 4 sprinklers, and 24 freight cars. There are six power stations, four of them also providing electric light for the streets. The motor cars are from 17 to 20 horse-power.

Electric Railway Information Wanted.

Señor R. Elizalde, a civil engineer in Mexico, and government inspector of railways and tramways for the district including the capitol, writes to the ELECTRICAL REVIEW as follows:

"I am making a careful study of projects for replacing the animal traction lines in this city and others of importance, such as Guadalajara, with either electric or cable systems. . . . I am anxious to receive catalogues and price lists, together with full descriptions, of electrical traction apparatus of all sorts, motors, auxiliary and repair parts, etc."

Señor Elizalde may be addressed at Merced de las Huertas No. 6, Popotla, Mexico City.

Electrical Review

OLDEST ELECTRICAL WEEKLY IN THE UNITED STATES.

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News, Subscriptions and Advertisements.

SPECIAL NOTICE TO ADVERTISERS.

CHANGES for advertisements must be in this office by Friday noon for the following week's issue. NEW ADVERTISEMENTS should be in the office not later than Saturday noon to insure publication the following week, although it is occasionally possible to get in matter received on Monday.

Subscription to the ELECTRICAL REVIEW.

One Year, United States and Canada, - - $3.00
One Year, Foreign Countries, - - - - - 5.00
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CONTENTS.

Views, News and Interviews..... 385
An Electrically Operated 150-Ton Revolving Derrick..... 385
The Films that Failed..... 386
Electrical Features at The Greater-America Exposition, Omaha..... 387
Science Brevities..... 388
Whitening a Negro by Electricity..... 389
Obituary..... 389
The Latest and Largest Statue of Benjamin Franklin..... 389
Electric Railways in Germany..... 389
Electric Railway Information Wanted..... 389
An Electro-Antiseptic Cure for Tuberculosis..... 390
Electromobiles..... 390
Electromobile Accumulators..... 390
Fair Prices for Electrical Supplies..... 390
"Electromobile"..... 391
Personal..... 391
Changes in United Electric Light and Power Company's Directory..... 391
Death of Norman Williams..... 391
Electromobile Rights..... 391
Alternating-Current Generation and Distribution..... 392
Independent Telephone Association of the United States..... 394
Chicago Electrical Notes..... 394
Franklin Institute..... 395
American Institute of Electrical Engineers..... 395
An Express Metallic Switchboard..... 395
Railway Telephone System in the West Indies..... 395
The Accident of Birth..... 395
Annual Meeting of the Chicago Edison Company..... 396
A Direct-Reading Volt-Ammeter..... 396
A Meeting of New England Electrical Supply Dealers..... 396
Mr. Charles J. Glidden's Views on the Telephone Situation..... 396
Water-Power Electric Plants in the United States..... 397
Dividends..... 397
Decision on the Carty "Bridging Bell" Telephone Patent..... 397
A Prophet Ariseth!..... 397
Electricity in a Naval Machine Shop..... 398
The Riker Electric Vehicle Company..... 398
A New Directory..... 398
Electric Railway Notes..... 398
Planked Shad for Electricians..... 398
Experiments with the Caldwell Caldwell Interrupter..... 399
Another Advantage of the Electric Railway..... 399
Wall Street and the Electrical Stock Market..... 399
A Lay of the Mains..... 399
Hot Weather Compliments for a Street Railway Company..... 399
Advance Information..... 400
Kindred Interests..... xix
Electrical Patents..... xx
Industrial Notes..... xx

Advertisers' Alphabetical and Classified Index on page xvi.

AN ELECTRO-ANTISEPTIC CURE FOR TUBERCULOSIS.

There has been much interest in medical circles concerning the remarkable statements made by M. Francisque Crotte at the recent medical congress at Cleveland, Ohio. M. Crotte, who says that he is a chemist rather than a physician, claims to have been amazingly successful in the treatment of tuberculosis by formaldehyde, in conjunction with static electricity.

He proposes to open a public clinic in Chicago for the treatment of poor persons suffering from tuberculosis and is confident he will be able to demonstrate the efficacy of his treatment. His only requirement will be that those presenting themselves for treatment shall bring with them certificates from the city authorities to the effect they have not the means for paying for it. It is his purpose also to establish public clinics in New York and probably in San Francisco.

For nearly 30 years M. Crotte has been applying himself to the study of germicides and bacterial diseases, and five years ago he hit upon static electricity as a means for the introduction of an effective antiseptic into the human system. A sponge saturated with the medicament is placed upon the breast of the patient to which is attached the positive electric pole. The negative pole is placed on the patient's back, and the current, he says, forces the medicament through all the pores of the patient's body. The medicine is inhaled also.

Formaldehyde, which is the antiseptic used, is an immensely powerful germicide and also a dangerous poison. It is decomposed by heat and evaporates completely when exposed to the air. It earned an unenviable reputation recently in connection with the army beef scandal, as it was supposedly the embalming agent employed. There is nothing new in the employment of the electric current to convey medicaments into the body, the ungainly name "cataphoresis" having been invented some years ago to describe this action.

It is to be hoped that M. Crotte can substantiate his claims. Then, with X-rays to diagnose consumption, and the electrical formaldehyde treatment to cure it, electricity will have accomplished the greatest possible boon for the human race—the conquest of the scourge which sends one-seventh of mankind to their graves.

ELECTROMOBILES.

The name "electromobile," which was selected by the ELECTRICAL REVIEW'S name committee, does not seem to please everybody. It is true that this state of things was rather to be expected, because nearly everybody interested in electromobiles has a name of his own choosing for these machines. One peculiar advantage of the name, which seems to have escaped attention hitherto, is the fact that it is international in its application. M. Hospitalier, in the last number of *L'Industrie Electrique*, uses the name "électromobile," and it has also found favor in some Austrian journals. Whether it will be adopted into the German language can not be said at this writing, the genius of that tongue apparently revolting at any name so short and euphonious.

Complaint seems to have been centered upon two aspects of the new word—that it is a hybrid, being part Latin and part Greek, and that it is too long. In the same category precisely may be mentioned "radio phone." The words telegraph, telephone, thermometer, etc., which are in daily use, are very nearly as long, and certainly no more euphonious than electromobile. The tendency of the times is to shorten words. There seems to be no doubt that electromobile will become "mobile," or, perhaps, "mobe," in popular phrase. The two-syllable word is shorter than victoria, brougham, etc., and very much more pronouncable than hansom, surrey or buggy. The ELECTRICAL REVIEW believes that the word has come to stay. The mere fact of its hybrid origin certainly does not bar it from acceptance in the English language, the most hybrid of tongues.

ELECTROMOBILE ACCUMULATORS.

One of the most deplorable of facts is the specific gravity of lead. So far this metal and its salts have been the only substances that have given entire satisfaction as the working electrodes of accumulators. Carbon in saline solutions, copper and zinc, zinc and lead plates in sulphates of cadmium and zinc—all sorts of combinations have been tried, but the results have been disappointing. The accumulator is still heavy—far too heavy; meanwhile the electromobile is in urgent need of a lighter equipment. It has been said that no great invention waits long to appear when the demand for it becomes sufficiently strong. If this is true it will not be long before a lighter accumulator is produced. There is hardly any improvement in electrical apparatus so greatly needed. Given a light, mechanically strong accumulator that will stand heavy charging and discharging, the electromobile problem becomes comparatively simple. This vehicle now carries a burdensome handicap of weight, and its radius of operation is too short. Here is a problem that ought to interest all inventors and experimenters. The market for such an accumulator is ready-made, and will be enormous.

FAIR PRICES FOR ELECTRICAL SUPPLIES.

To the movement now gathering way among electrical supply dealers the ELECTRICAL REVIEW wishes to offer its cordial support and encouragement. This movement is toward placing the prices of standard manufactured products, for electric lighting and household uses, on a basis allowing a more reasonable margin of profit than heretofore, and permitting a continued output of best-quality products. In many instances, during the past three years, prices quoted have been such that no profit remained for the supply houses after sales charges were paid, competition among them being extremely sharp. The purpose of the movement, while it will result in better trade conditions, is in no sense towards the formation of a combination or trust.

"ELECTROMOBILE."

OPINIONS OF MANY SHADES FROM MANY SOURCES CONCERNING THE NEW WORD.

Below will be found a number of communications from those interested in electromobiles with reference to the new designation:

"THE SUN" SANCTIONS "ELECTROMOBILE."

[*From the New York Sun, June 18, 1899.*]

". . . It should not be surprising to see a gypsy traveling in an electromobile soon, for his traveling home is the pride of his life. . . ."

MR. EDISON IS SATISFIED WITH "ELECTROMOBILE."

To the Editor of Electrical Review:

In reply to your favor of the 9th instant, I beg to state that I think the name mentioned is one of the best that could be selected.

Yours truly,
THOS. A. EDISON.

Orange, N. J., June 13.

MR. HILL PREFERS A LONGER TERM.

To the Editor of Electrical Review:

I beg to acknowledge your esteemed favor of June 9. To be frank, it does not seem to me that you have struck it yet in the word "Electromobile;" although I am not prepared to make any suggestions as to an improvement upon that word. "Electric Automobile" still sticks to me.

Yours very truly,
J. M. HILL.

New York, June 14.

MR. CORRIGAN LIKES "ELECTROMOBILE" AND WILL ADOPT THE WORD.

Your favor of the 9th inst. received. I have been deeply interested in the question of the evolution or adoption of a correct and desirable word or name to designate the electric carriage. I am well pleased with the word "Electromobile." I doubt if a better word could have been selected or "hit upon" for the purpose. It seems necessary and desirable, as time goes on, to use such a name or word as will instantly and clearly convey to the mind of any one the distinction between the electric and other styles of self-propelling vehicles. We will adopt the name, and do all we can to popularize it. We appreciate your interest and enterprise.

Yours very truly,
American Electric Vehicle Company.
Per C. E. CORRIGAN,
General Manager.

Chicago, June 14.

PROF. ELIHU THOMSON IS SATISFIED WITH "ELECTRIC CARRIAGE."

To the Editor of Electrical Review:

Your letter asking my opinion of the word "Electromobile" is at hand. I am satisfied with the term "Electric Carriage," which is no longer, except by a letter or two, and goes along with "Electric Car," which is in universal use in English. Besides, we can have electric trucks, electric cabs, etc., to the end of the list.

My own preference is for plain terms which express the meaning, especially when they are not any longer to speak than those which may be proposed for adoption. After all, common use and practice settles what term will be employed, and the question will have to be left to the people in general to decide.

Will it now be in order for some one to propose *aeromobile* for a compressed air carriage; *steamomobile* or *vapomobile* for a steam carriage; *gasolenomobile* for a gasolene carriage; and *kerosomobile* for a kerosene-propelled carriage?

"Electromobile" having set the pace, there will be no need of issuing prizes on these last suggestions.

Yours very truly,
ELIHU THOMSON.

Lynn, Mass., June 16.

MR. H. H. EAMES'S OPINION.

To the Editor of Electrical Review:

Your esteemed communication of June 8, addressed to Col. A. A. Pope, has been duly referred to us for consideration and reply.

We fear that the American public has already decided upon what the name shall be for the "horseless carriage" without reference to means of propulsion, and while "electromobile" seems to be a very suitable selection, as could not have been otherwise with such a committee, we are inclined to believe that the public has altogether anticipated our action by the use of the word "automobile," strange enough taking it from the French instead of adopting the current and well established British word "autocar." This has been suggested as being due to the possible confusion of the latter term with the street car in this country.

This matter has been very much discussed here ever since we started our work, and while "automobile" was by no means our final selection, we have been compelled to consider it as the one adopted by the public and therefore the American name for the apparatus in question.

Very respectfully,
Columbia and Electric Vehicle Company. H. H. EAMES.

Hartford, Ct., June 16.

PERSONAL.

Mr. S. Marsh Young, of the Manhattan General Construction Company, New York city, and Mrs. Anna L. Brandt, of Chicago, were married, on June 14, at the home of the bride's parents in Chicago.

Messrs. Joseph Wetzler, of New York city, and John W. Howell, of the Edison Lamp Works, at Harrison, N. J., have received the honorary degree of electrical engineer from the Stevens Institute of Technology, Hoboken, N. J.

Mr. Oscar Oliven, an electrical engineer connected with the Union Electrical Company, of Berlin, Germany, is visiting the United States to observe our progress in electrical matters. Mr. Oliven expressed surprise at the great number of electromobiles in service in New York city.

Mr. Charles F. Thompson has resigned his offices as director, secretary and treasurer of the Lane & Bodley Company, engine manufacturers, of Cincinnati. Mr. Thompson has been with the company 35 years, and will sever his connection on July 1. His successor has not yet been named and Mr. Thompson has not decided on his future movements.

Mr. John Cassidy, superintendent of the Mutual Telephone Company, Honolulu, H. I., with Mrs. Cassidy, spent last week in New York city. Mr. Cassidy is the pioneer telephone man in the Hawaiian Islands, and has built up quite an extensive telephone exchange in Honolulu. The citizens of that city of some 30,000 inhabitants, are extensive users of the telephone, and the list of subscribers is constantly increasing. Mr. Cassidy reports that a general growth of all electrical interests in these islands is to be noticed, and anticipates a large increase in all branches of the industry.

Changes in United Electric Light and Power Company's Directory.

Eight out of the 13 directors of the United Electric Light and Power Company, New York, retired at a meeting on June 19. The choice of new members resulted in the election of George Westinghouse, Paul D. Cravath, George W. Hebard, C. H. Jackson and Ph. Ferd Kobbe. The new directors elected were George .H Church, George H. Rae, Benjamin Whiteley, Cortland Betts, Arthur Starke, Osborn W. Bright, Joseph F. Sweasy and A. Murray Young. They take the places of Brayton Ives, Marcellus Hartley, C. J. Canda, August Belmont, Henry B. Hyde, who died recently, Charles F. Adams, Duncan D. Parmly and James Stokes.

Death of Norman Williams.

Mr. Norman Williams, of Chicago, well known as a lawyer and financier, and largely interested in electrical enterprises, died at his Summer cottage, at Little Boar's Head, Hampton Beach, N. H., on June 19. Mr. Williams had been at Hampton Beach since April. He leaves a widow, one son, Norman Williams, Jr., and two daughters, Miss Mary Williams and Mrs. Merritt, the wife of Gen. Wesley Merritt, all of whom were at his bedside when death came.

Mr. Williams was born in Woodstock, Vt., February 1, 1835, and was graduated from the University of Vermont in 1855. He went to Chicago soon afterward and began the practice of law. He was interested in many business enterprises in that city, being one of the organizers of the Chicago Telephone Company and a director in the Western Electric Company, Central Union Telephone Company and District Commercial National Bank. The burial was at Woodstock, Vt.

Electromobile Rights.

The Chicago park commissioners have forbidden electromobiles the right of access to the parks and boulevards of that city. With the understanding that the park board was determined to keep its threat and enforce the ruling, Gen.-Mgr. C. E. Woods, of the Fischer Equipment Company, started from his offices for a ride down Michigan Boulevard with a two-seated electromobile a few days ago. Three officials of the company were with him. Nothing happened to mar the pleasure of the occasion, but in a subsequent trip Mr. Woods, together with Messrs. H. G. Osborne, George F. Marchant and A. Hart-Smith succeeded in being arrested.

Mr. Marchant's case was tried before a police justice on June 20, and he was acquitted, the justice holding that the prisoner, when he rode peacefully along Michigan boulevard. had not created, aided, countenanced or assisted any riot, disturbance or other disorderly conduct, as charged by the policeman who arrested him, and that electric vehicles may be propelled along Chicago streets until doomsday unless new laws are passed on the subject.

Mr. Osborne is testing the authority of the Park Commissioners by petitioning for his release on a writ of habeas corpus, thus taking the matter into the higher courts.

The petition sets up that Osborne was wrongfully deprived of his liberty for an alleged breach of the boulevard ordinances. As ground for the issue of the order of release it declares that the running of an electromobile on the boulevard is not a breach of the peace nor a disorderly act, and declares that the purported act or ordinance of the commissioners prohibiting the running of electromobiles upon the boulevards is an unwarranted exercise of police powers.

ALTERNATING-CURRENT GENERATION AND DISTRIBUTION.

THE DISCUSSION FOLLOWING MR. ATKINSON'S PAPER ON THIS SUBJECT BEFORE THE NATIONAL ELECTRIC LIGHT ASSOCIATION.*

(Concluded from page 377.)

Mr. Crosby said it had occurred to some that electromobiles would be charged from a street corner "plug" arrangement, which would feed the vehicle while the driver was at lunch or waiting for a fare. He wished to know if the driver could be intrusted with the charging.

Mr. Booth said: "It is perfectly feasible as far as the matter of intelligence required is concerned. A device can be made in which it would be simply necessary to insert a plug and receive the charge, and undoubtedly such stations will be necessary, but generally the main charging, it seems to me, can be done from central stations, provided there are a sufficient number of them, and the driver is not compelled to run too far. A matter of 10 miles will eliminate them from the question."

Mr. Ayer: "It strikes me in the present state of the development of the business that we have about as much of an answer to the question as is possible. We can not imagine the extent it will reach, though most of us, who are sanguine, can see a very large development; but it comes, like many other questions, to be a local matter. In the smaller cities two or three charging stations are going to be absolute necessities, and there will also be the necessity of intelligent care of the batteries. The owner of the vehicle can not take care of them, and batteries have not reached such a state of development that they may be put into the hands of the average coachman. In the larger cities there will be these central stations for the charging and care of the batteries, and also hospitals for their repair. I do not believe we can see so far ahead to-day as to be able to lay down any general rule to cover the ground. The question of what is the best current to be used would hardly be affected by this thing, because rotary transformers will be applicable to the few central stations that may be required. When it comes to the large cities, we have the direct-current distribution, which is not likely to be changed. A local service may be given—that is, taps may be maintained. A service of that character is going to be called for, but it seems that in the early stage of development of the automobile it will be necessary to have central stations at which to groom the batteries as well as charge them."

The President said that he brought up the electromobile subject purposely to bring out certain ideas which might lead the manufacturers to think about the matter and prepare a way that will make it satisfactory and easy for the central stations to serve this new business. He believed firmly that the electromobile had come to stay and will be to the electric light industry what the fuel-gas problem is to the gas industry.

Mr. Scovil said that some owners of electromobiles in Cleveland were using small rotary converters to charge their vehicles at night. Mr. Doherty thought that any one able to pay $2,000 or $3,000 for an electromobile could easily afford a small direct-current motor-driven dynamo for charging in situations where only alternating currents are supplied.

Mr. Lieb said: "The storage battery is looked upon in alternating-current circles with a great deal of suspicion. After having run down the battery in an automobile, in charging it we must not start at more than 50 volts and gradually let out the resistance and get up to 110 volts. Then they tell us that, in a battery running, say, 25 miles in four hours, it will take at least the same number of hours to recharge it, otherwise the battery is injured. It might be interesting to the convention to know that in New York city the Edison company sell orders for automobiles, who will agree to take a minimum amount, at the rate of five cents a kilowatt, and the automobile people will guarantee to haul a thousand pounds in the streets of New York for six-tenths of a cent per mile, on this basis of five cents a kilowatt, and it is away down below horse transportation. It certainly would be an interesting thing, however, to imagine a wagon standing four hours on a corner in New York city being recharged. It is interesting from the statistics gathered here to learn that it costs 25 cents per ton-mile to haul coal through the streets of New York. When the automobile people speak of six-tenths of a cent for a half ton-mile it includes the weight of the vehicle, which, in the matter of freight, would be 100 per cent more than the freight. A passenger automobile weighs 3,000 pounds, so that the discrepancy there is very great. The automobile business from the standpoint of the private owner would probably work out something like this—that a man who has a private house in New York will knock out the basement door and take his automobile in at night and charge it in the house from a 110-volt circuit. I think the whole storage battery question may be simplified as applied to the automobile question, for the reason that we get away from large plates. These plates are so small that a plate which will not buckle can be made. As to the question of cost, instead of having a battery in which we are all fighting for life and efficiency we will get down at once to a cheap battery. We will put a battery in the carriage which will cost $100, instead of $400, and instead of guaranteeing it for 10 years we will guarantee it for one year, and send the lead back and remelt it, instead of struggling to get a battery which will live for years. The firm of B. Altman & Co., of this city, is putting in an automobile plant to displace its horses, and it can put twice the number of vehicles in the space formerly occupied by horses and wagons, plus the feed. Altman may finally sell current to other dry-goods establishments, and in that way the thing will be divided up."

Mr. Edgar said: "I believe that the next five years is going to see such a development in automobile work that it will be the second largest portion of our business. I am an enthusiast on the subject, and believe that the horse is doomed for business purposes in the streets as he has been for street-railway cars. It is not a question whether automobile owners are going to use electricity, but whether they are going to make it themselves or buy it from the illuminating companies. We may be met with the problem that the large automobile companies will make their own current. To me it is the most important feature of the electric lighting business to-day, to find out the best way of approaching the subject of the sale of electricity to automobile companies. As I understand it this is not an automobile discussion, but is entirely as to whether the alternating or continuous current is best, with special reference to the automobile work. I believe that the great bulk of the electricity used for automobiles for the first few years to come is going to be obtained from large stations. I think what the New York Vehicle Company is doing at their station will be repeated in the large cities of the country—that the great bulk of the vehicles will be charged from a central station plant. That can be done either by the alternating or continuous current, as it may be generated at the station. An alternating company could send current to the vehicle company to be transformed by means of rotaries, so that, for that part of the business, there is no more difference between the alternating and continuous current than there is in respect to these currents as applied to lighting; but back of it is that question of being able to charge these batteries from incidental places.

Mr. Crosby: "It is important for us to determine this question if possible, because it would be a powerful argument in extending the system of direct-current distribution if we could feel that in the course of five years the service would turn on the current for the automobile. We could well afford to set aside certain considerations in favor of the alternating system, in a certain district concerning which we are in doubt, if we had reason to believe that in five years every house, substantially, would have in its basement an automobile that could be charged at night or in the daytime. That is the important point of view bearing on the discussion."

Mr. Edgar remarked that he did not think the idea of charging station at every street corner is coming into use. "I believe there is going to be a great business done in the incidental use of our current in the running of automobiles, and that in a city like New York, charging-posts will have to be erected in 50 places—what you might call in the outskirts. . . In Atlanta they have come to the idea of the continuous current in the heart of the city; in this way they could take care of the automobiles, and have rotary transformers in the suburbs; but that would be more or less incidental. I am connected with an electric launch company, and appreciate more than many others the great drawback the almost universal existence of alternating-current stations in the country has been to that business. It has been almost impossible for us to sell electric boats during the last five years. I know that the widespread use of alternating current has also been a drawback to the automobile business. The makers have been unable to send the vehicles into any towns except 100 of the largest cities. I was getting ready to say, from my standpoint as an exponent of the constant-potential circuits, the question of the automobile will ultimately settle it, if nothing else does."

Mr. Doherty: "I think the question hinges on the cost of the installation. We will say that it is a matter of 50 stations, and we have to put in a moter-driven dynamo in every station for direct current, each motor costing $300, which amounts to $15,000. I do not think that would buy very much copper for a low-tension circuit. Any one who can run an automobile can run a motor-driven dynamo. Much has been sacrificed, as a matter of sentiment, in favor of the direct current. If we can afford to put $100,000 extra in copper, we could afford to put a portion of that into induction motors and the appliances that would give us direct current in the few instances where it is needed, without the expense of a low-tension system.

Mr. Edgar: "I do not believe the average man who is going to drive an automobile in the future will know enough to start and stop a rotary converter. I am a believer in the idea that men and women, boys and girls, will drive automobiles as they have in the past driven horses, and all that will be practicable for them to do will be to get electricity somewhere to get back to the station—simply enough as an emergency to get to some central station. I admit that, looking at it from the investors' standpoint, large companies, like those in New York and Boston, might be able to afford to put in a number of charging stations; but that means real estate, a permanent holding of land, whereas these posts, such as the one designed by the New York Edison Company, or the one in Boston, which was designed last Fall by our own people, is simply a post on the street, like a lamp-post, and it will fill an urgent want."

Mr. Doherty said that, when one is running a motor-driven dynamo he is doing no more than in operating an electromobile. "If a driver can run an automobile, I do not see why he can not run the motor to drive the

* See the ELECTRICAL REVIEW, May 31, June 7 and 14, 1899.

dynamo. In each case he has to watch his current. He can plug in the full 110 volts in either case, or he can gradually get up to that amount. The motor is not entirely automatic in either case, but it can be made as nearly so with a motor-driven dynamo, as in using the Edison current direct at 110 volts."

Mr. Lisle said that the Narragansett Electric Light Company had to meet that position. "We met it by putting in a motor on our 500-volt service, running a 110 volt meter. It is run in the stable of a department store and has been handled by green men for some time. They start the batteries by throwing a switch. They charge the batteries for three wagons, and we have had no trouble through their burning out apparatus. How it will be when the business grows universally I do not know, but that is the present situation. There has been no trouble and the uneducated stable man is taking care of the motor and generating apparatus."

Mr. Lieb: "The question had been mooted here that possibly the automobile companies may go into the generating of electricity on their own account. I think that is the very thing which will discourage our whole electric lighting situation. We are interested in selling current, but here is a man putting in his own plant. I say let him do it. When he can not buy current at a better price than five cents per kilowatt between 12 o'clock at night and 6 o'clock in the morning he would be foolish not to put in his own plant. If we think we are going to get 10 to 15 cents per kilowatt in the future, we will be mistaken. If gas was selling at $2 a thousand feet nearly every hotel would have its own plant. We must make electricity so cheap that the other fellow can not afford to put in his own plant. If a man will take current between 12 and 3 o'clock at night, we should fix the price accordingly; we will in that way have a straight line on our station load-curve, and sell thousands of kilowatts every night for automobiles and will not know it at the station, because we will not burn any more coal."

At this point the discussion was suspended for a few minutes for the passage of a resolution. It was resumed by Mr. Crosby, who said: "If the art is so developed that the batteries can be charged at every street corner, which is a mere piece of rhetoric, it would be a powerful argument tending toward the spread of the area covered by direct current. The great question presented by Mr. Atkinson's paper, is—what shall we do with general motor service, as between alternating and direct current? I had hope that, by going over the questions in their order, we might get such expressions as would leave at least a fairly well defined idea, even if we could not make it conclusive, that it is good judgment for those companies having a nucleus of direct current to constantly spread that, I can see how we must have the alternating current in a scattered district. The great question is whether we should enlarge the area of the alternating current and gradually push the direct current out as the city should grow, or whether, on the other hand, we want to push the direct current and wipe out the alternating. I would suggest that Mr. Barstow, of Brooklyn, endeavor to sum up the discussion."

Mr. Barstow: "The question as I understand it is as to the extension of the direct or alternating current in Brooklyn. The question is an important one, but it has behind it more than the mere use of the alternating or direct-current system, because it carries with the matter of frequency of the transmitting system. If we have to develop the alternating side of the business, a frequency of 60 cycles would be of advantage; if, on the other hand, the direct current side of the business is to be developed, a lower frequency could be used to advantage. In going all over the situation very carefully we decided that it was not what the engineers of the company would do, but what the public wanted; in other words, the central station was manufacturing current to sell, and if the central station would not sell the current there was no use in manufacturing it. That led to the question as to which system would be of greater service to the users of the current; would the use of the current from the standpoint of the public, develop in the direction of alternating current or in the direction of the direct current? There is no doubt that there are a large number of things that can be best done with one or the other of these currents, but you have to consider what the bulk of the business is to be. As has been mentioned in the discussion here, if you should adopt the alternating system, and the automobile business should increase and a lot of other uses for the direct current come up, you would have to put in rotary converters and the first thing you knew you would have direct current substations, so that it is a question to start out with as to which system the public are going to use the most. At the time we took up this problem we were developing a territory just lying outside of Brooklyn—Coney Island. Coney Island is a peculiar place and the population is very transitory; it comes and goes. The business is for about four months in the Summer time. The business, when it does come, is wonderfully good, because people go there to spend money. The substation which we located at that place is eight miles from our Bay Ridge station. The business would not support an underground system and the question came up whether it should be developed on the continuous current side or the alternating side. We laid 6,000-volt feeders down to the substation, and from that point we constructed overhead trunk lines, of both alternating and continuous current, starting out with an equal capacity of 200 kilowatts each. We discovered that, if we maintained the position of not furnishing direct current, the people who use the light and power in their shows and halls would not adapt themselves to the alternating current, and, rather than do that, would put in isolated plants, and we gradually started in to supply the customer with either kind of current, whichever he wanted. The result at the end of a year and a half has been 100 kilowatts of alternating and 850 kilowatts of direct current, and it is very difficult, indeed, to keep up the supply of direct current. That territory simply developed itself. In addition to that, we found that we had to have facilities for charging automobiles, which were not considered at the time we started out. It is safe to say, therefore, that that substation, overhead, at the end of another year will do almost seven-eighths of its business on the direct current. That is an isolated condition which, if anything, would point to the use of alternating current, because it is overhead and more or less scattered. The question of using alternating or direct current in a large city always depends directly on the customers. If a company has competition, the customer will not put in rotary transformers to get the direct current as long as he can get that direct current from some other company. That is true also of the alternating current. I notice abroad, and also in the large cities in this country, that the tendency seems to be still to develop the heavy part of the business around in the city proper with the direct current, and to keep the alternating current as a pioneer system to build up the outskirts. What this eventually means we have appreciated in Brooklyn, where two substations have been placed about a mile and a half apart. Each substation has been treated as a small station. Its immediate neighborhood was covered with the low-tension underground system, and the neighborhood outside of that with the alternating system. We found that when the two methods came together the alternating system had been squeezed out, so that when the two systems were united the alternating was entirely removed from them. It looks to me, based on all the conditions of our own development, as if the use of the direct current is going to be the outcome. The question is one of local conditions and cost. I agree with Mr. Edgar that we do not appreciate what the automobile business is going to be any more than we appreciated what the trolley roads were going to be. I think this business will be a very valuable adjunct to a station, which ought to be considered. I want to emphasize, more than anything else, that the supplying of the current is really in the hands of the customer. That is the outlet that must be considered almost wholly. Of course we have everything in our stations except single-phase, 133-cycle. We have two-phase, 60-cycle; three-phase, 60-cycle, and for driving our large machines we have three-phase, 25-cycle. As far as the difference between the alternating current motor and the direct-current motor goes it all depends, again, upon what the customer wants. We mapped out a little district and decided that we would use alternating current in that district; but the first customer who came in wanted a direct-current motor. It is all to be decided, again, from the standpoint of the customer. I think the alternating-current motor is as satisfactory as the direct-current motor, as far as the actual operation of the motor is concerned. We have not any single-phase motors. As to doing exact work with multiphase motors, we had quite an experience. There is a district which was removed from the direct-current center and was covered by the alternating current, and without thinking much about it a 25-horse-power alternating motor was put in, and we are now using our utmost endeavors to get it out. The motor is designed to take an excessive amount of current in starting. While the customers used the motor belted on the counter-shaft it was all right, but they discovered that they would like to have the motor direct-connected to a hoist to lift a street garbage-cart and dump its contents into a scow, and every time they lift it we know it. The question is whether we can dictate to the customer what they are going to use the motor for? They say that they contracted for the motor, paid for it, and are going to use it. We are thinking of extending our lines and putting this motor on the direct current. It is more a case of what the customer wants than anything else, and also the fact of the price. We have five or six places which have both motors installed, running side by side. This came about through the consolidation of two companies, and the two motors are run side by side, belted on a countershaft about 12 feet apart. We asked which motor he wanted, and he said he didn't care — whichever one he could run the cheapest."

Replying to a question by Mr. Lieb, Mr. Barstow said: "In this case I speak of, the motors in the two cases are exactly of the same size, the shop is of moderate size, and on one side is the countershafting, the machines on the other side being belted to this. They run one set of motors one day and the other set the next day, and they seem to be equally satisfactory."

The discussion was closed by Mr. Lieb, who said: "I agree with Mr. Barstow that the alternating current apparatus is not as satisfactory to the customer as direct-current apparatus, but I think it is clearly and easily explained by the fact that manufacturers, inventors and designers of alternating apparatus have not had the inducement which they have had in direct-current machinery to perfect the various points of the apparatus. If the alternating motor is pushed and the demand increased, I do not think there is any question about the manufacturers meeting the demand. We have had some very bad direct-current apparatus, and still get some which is poor, but when we select the particular kind of apparatus we want for a particular purpose I do not think the manufacturer will fall down."

INDEPENDENT TELEPHONE ASSOCIATION OF THE UNITED STATES.

The Annual Convention to be Held in Chicago, June 26, 27, 28, at the Auditorium Hotel.

ARRANGEMENTS FOR AN IMPORTANT AND LARGELY ATTENDED MEETING—NAMES OF OFFICERS FROM DIFFERENT STATES.

It is the expectation that the largest and most important gathering of the representatives of the independent telephone interests of the United States will assemble in the city of Chicago next week. The executive committee and the advisory board of this association is to meet in the parlor of the Auditorium annex Monday evening, June 26, and the convention will be held in the assembly hall of the Auditorium Hotel Tuesday and Wednesday. It is expected that the programme, which was published in the ELECTRICAL REVIEW last week, will provoke a great deal of discussion, and the business meetings of the association are likely to be very important.

The electrical manufacturing and supply companies of Chicago, with characteristic enterprise and liberality, have taken hold of the local situation and will extend a hospitable reception to the visitors. A number of events and entertainments have been scheduled, chief of which are a boat ride on the lake and a tally-ho ride through the extensive parks of Chicago.

The manufacturers of telephone apparatus of the country are expected to attend, and the meeting will undoubtedly be the largest and most representative of the independent telephone interests of the country that has ever been held.

On Wednesday evening the meeting will terminate with a banquet at which a number of excellent toasts are to be delivered. All persons connected in any way with the independent telephone interests are invited to attend the convention, and new members from this field will be welcomed.

According to the programme the first session is to be held at 10 o'clock A. M., Tuesday, June 27, and the afternoon session at two o'clock of that day. The concluding sessions are on Wednesday.

The officers of the association, which is named "The Independent Telephone Association of the United States of America," are the following named gentlemen:

President, J. M. Thomas, Chillicothe, Ohio.

First vice-president, Col. H. C. Young, Columbia, Pa.

Second vice-president, S. T. Slade, Oskaloosa, Iowa.

Third vice-president, J. B. Ware, Grand Rapids, Mich.

Secretary, W. J. Vesey, Fort Wayne, Ind.

Assistant secretaries, G. W. Beers, Fort Wayne, and D. C. Dow, Cobleskill, N. Y.

Treasurer, L. A Carr, Durham, N. C.

Advisory board: James M. Thomas, Chillicothe, Ohio; Wm. J. Vesey, Fort Wayne, Ind.; H. D. Critchfield, Mt. Vernon, Ohio; Hugh Dougherty, Bluffton, Ind.; E. B. Fisher, Grand Rapids, Mich.

The executive committee composed of two representatives from each state represented at the last meeting:

E. C. Pierce, Barberton, Ohio.
A. B. Coon, Marengo, Ill.
T. A. Rockwell, Oshkosh, Wis.
Thos. Fricker, Ashtabula, Ohio.
Wm. G. King, Chardon, Ohio.
C. D. Terrell, Jackson, Miss.
W. L. Crissman, Cedar Rapids, Iowa.
L. R. Heath, Mercer, Pa.
F. L. Beam, Mount Vernon, Ohio.
H. D. Critchfield, Mount Vernon, Ohio.
Jas. B. McKell, Chillicothe, Ohio.
Chas. D. Duncan, Chillicothe, Ohio.
Peter White, Ishpeming, Mich.
H. C. Hedges, Lansing, Mich.
Geo. W. Finch, Escanaba, Mich.
D. A. Reynolds, Jackson, Mich.
Geo. Beaton, Detroit, Mich.
E. H. Andress, Lafayette, Ind.
John McGregor, Madison, Ind.
L. A. Frazee, Connorsville, Ind.
Geo. W. Beers, Fort Wayne, Ind.
C. M. Zion, Lebanon, Ind.
J. H. Murphy, New Albany, Ind.
C. M. McCabe, Covington, Ind.
Delos Thompson, Rensselaer, Ind.
R. F. Blount, Wabash, Ind.
Jesse Weik, Greencastle, Ind.
Hugh Dougherty, Bluffton, Ind.
W. J. Vesey, Fort Wayne, Ind.
J. L. Stone, Rushville, Ind.
Charles Flowers, Detroit, Mich.
F. M. Ash, Dearborn, Mich.
J. D. Ware, Grand Rapids, Mich.
C. P. Collins, Wayne, Mich.
Hugh O'Connor, Plymouth, Mich.
W. C. Sterling, Jr., Monroe, Mich.
W. C. Sterling, Sr., Monroe, Mich.
Geo. M. Connor, Mount Clemens, Mich.
John T. Holmes, Port Huron, Mich.
Justin R. Whiting, St. Clair, Mich.
Dr. J. Williams, Jr., Adrian, Mich.
Wm. H. Blake, Cheboygan, Mich.
H. H. Hatch, Pontiac, Mich.
E. H. Parker, Flushing, Mich.
Frank A. Vernor, Memphis, Mich.
J. H. Fildew, St. Johns, Mich.
G. A. Weed, Lake Odessa, Mich.
E. S. Rogers, Owosso, Mich.
W. O. King, Corunna, Mich.
I. N. Starkweather, Northville, Mich.
V. O. Whipple, Northville, Mich.
A. I. McLeod, Ypsilanti, Mich.
W. L. Holmes, Detroit, Mich.
T. F. Ahearn, Detroit, Mich.
J. G. Johnson, Three Rivers, Mich.
W. H. Gilbert, Saginaw, Mich.
S. G. Higgins, Saginaw, Mich.
Chas. E. Bell, Everett, Mich.
Geo. D. Bouton, Ann Arbor, Mich.
A. J. Little, Battle Creek, Mich.
Jos. Walz, Walz Station, Mich.
W. H. Butler, Ravenna, Ohio.
Dan A. Mossman, Huntington, W. Va.
C. R. Savidge, Sunbury, Pa.
H. K. Cole, Owensboro, Ky.
S. T. Slade, Oskaloosa, Iowa.
H. C. Young, Columbia, Pa.
I. A. Lumpkin, Mattoon, Ill.
Louis Feder, Lima, Ohio.
W. B. Seaton, Ashland, Ky.
D. C. Dow, Cobleskill, N. Y.
Elmer E. Summey, Utica, N. Y.
Tom A. Marshall, Keithsburg, Ill.
J. M. Davison, Brewster, Ala.
F. L. Hawley, Florence, Ala.
A. C. Savidge, Sunbury, Pa.
W. H. Oplinger, Wadsworth, Ohio.

There will be a number of telephone exhibits at the Auditorium, and many of the manufacturers have engaged parlor headquarters.

CHICAGO ELECTRICAL NOTES.

The coming convention of the Independent Telephone Association of the United States, to be held at the Auditorium Hotel, Chicago, June 26, 27 and 28, promises to be the largest convention of its kind ever held. At no time during the life of independent telephony has the industry been in such a healthy condition, and manufacturers and supply dealers are kept extremely busy in filling their orders. Large shipments have been reported and many of the factories are compelled to work two forces of men, one night and one day. The trade is nearly centered in Chicago, and the delegates will be given a good chance to inspect the workings of the various factories. The first session of the convention will take place at 10 A. M., Tuesday morning, June 27, and this will be followed by other meetings. A grand banquet has been arranged for Wednesday evening which will conclude the convention proceedings. In addition to this, there will be an excursion and tally-ho ride.

It has been announced that the Strowger automatic telephone system would be the system used by the Illinois Telephone and Telegraph Company in the city of Chicago and Cook county, as a rival to the Chicago Telephone Company, and negotiations to that effect were closed recently. The new company, under their 30-year franchise, propose to begin construction operations and canvassing for subscribers immediately, with a view of having the exchange completely equipped and ready for business early next year.

The Strowger Company say their connection with the enterprise consists only of furnishing the equipment, switchboard system, instruments, etc. Subscriptions will be first sought from the present patrons of the Chicago Telephone Company, and charges for service will not commence until an exchange of 10,000 connections is in operation. The papers for the deal were signed by Albert G. Wheeler, who has been connected at various times with the General Electric Railway Company affairs, and alleged sale of its ordinance to Chicago City Railway, also with the installation of the Love conduit system on the Yerkes lines.

Mr. Wm. T. Blaine, president of the Victor Telephone Manufacturing Company, has returned to Chicago from a three months' absence, spent among telephone manufacturers of the country and leading financiers of New York city. Mr. Blaine hesitated to discuss the conditions of bringing together the manufacturing interests, stating that there had been many misleading, unauthorized and incorrect statements made in print regarding this matter. He finally states that at no time had there been a suggestion of failure in this undertaking, but that the interests involved from both the manufacturing, operative exchange and financial sides of the proposition had to be most carefully and properly investigated and looked into. He had at this time no question of the successful consummation of this effort to the great advancement and benefit of all parties concerned. It has been clearly shown, Mr. Blaine stated, that the opinion among all manufacturers that the proper standardization of apparatus involving all parts and appliances of central station equipment, telephones and parts, is almost a necessity, considering the broadening and extending lines of the independent field. Among the exchanges themselves an extended and diversified correspondence has clearly proven this to be the sincere wish of exchange owners and operators, and all those interested in the telephonic art from an operative standpoint. Whatever may be the result of Mr. Blaine's labors, it can be stated that a dignified, patient and persistent effort has been made to

bring this matter to a successful issue, and if Mr. Blaine is correct regarding his ideas of the attitude of the New York financiers with whom he is dealing, but about which he refuses to talk in detail, the independent field may expect to see in a reasonably short time the suggestions of this interview put into practical force. A standard of excellence on line equipment in exchange and toll-line work will also be one of the features of the new company's policy. It is believed that the beneficial effects would be very desirable and tend largely to increase the patronage of independent exchanges.

The South Park Board, of Chicago, at its regular meeting, June 14, decided to banish electrically propelled vehicles from the boulevards and parks. The reason for this action was the effect of the machines in frightening horses and endangering the lives of pedestrians and cyclists. It is also claimed the automobiles are run at higher than the legal rate of speed. The rule is to go into effect at once and the police ordered to arrest all violators. It seems doubtful whether this can be carried into effect or whether the Park Board have any right legally to enforce their action. It certainly does not seem that there is any great element of danger attached to the electromobile, and there is as yet no record of any accidents whatever. Of course the speed at which they are run might be too fast in some cases, but this could be easily regulated. If the rule is adopted it will make Chicago a laughing stock for a great many other cities, and give it a "back-number" reputation quite contrary to its usual methods of progression. A great number of the electromobiles now being manufactured are for the purpose of spins in the parks and boulevards, and if the rule is rigidly enforced will take away from the owners of the vehicles the only streets and boulevards they would care to ride on. The opinion of several leading manufacturers here is that the rule is not valid and will never be enforced.

F. E. C.

Franklin Institute.

At a stated meeting of the Franklin Institute, of Philadelphia, on June 21, Mr. T. B. Kinraide, of Jamaica Plain, Mass., will deliver an illustrated address on "The Application of Photography to the Study of the Structure of Electrical Discharges," and Mr. W. J. Clarke, of New York, will make an experimental exhibit of wireless telegraphy.

AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS.

PROGRAMME OF THE GENERAL MEETING TO BE HELD IN BOSTON NEXT WEEK.

The sixteenth general meeting of the institute will be held at the Massachusetts Institute of Technology, Boston, beginning on Monday, June 26, at 10 A. M. Daily sessions from 10 A. M. to 1.30 P. M. will be continued on Tuesday and Wednesday. The following papers will be presented:

"Symbolic Representation of General Alternating Waves and of Double Frequency Vector Products," by Charles P. Steinmetz, of Schenectady, N. Y.

"The Cost of Electricity in Some Typical Buildings in New York City," by Percival R. Moses, of New York.

"Plea for a Working Standard of Light," by S. Everett Doane, of Marlborough, Mass.

"Elements of Design Favorable to Speed Regulation in Plants Driven by Water-Power," by Allan V. Garratt, of Boston.

"Polyphase Electric Testing," by Prof. Harris J. Ryan, of Ithaca, N.Y.

"The Protection of Secondary Circuits from Fire Risks," by Dr. Cary T. Hutchinson, of New York.

"Notes on Recent Developments in Single-Phase Induction Motors," by Charles P. Steinmetz.

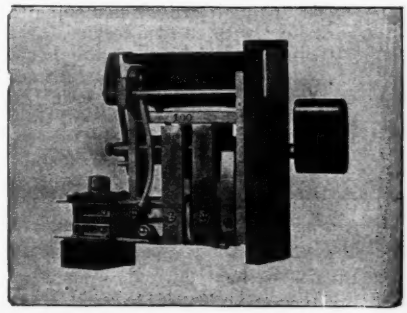
"Note on Progress of the Closed Globe Arc Lamp," by Louis B. Marks, of New York.

"Operating Costs of Horse and Electric Delivery Wagons in New York City," by Robert A. Fleiss, of New York.

"Air Gap and Core Distribution. The Magnetic Flux and its Effect Upon Regulation and the Efficiency of Dynamo-Electric Machinery." Part II. By Prof. W. E. Goldsborough, of Lafayette, Ind.

"An Apparatus for Photographing Periodic Current Waves," by Prof. Frank A. Laws, of Boston.

"Electric Automobiles," by E. A. Sperry, of Cleveland, Ohio.

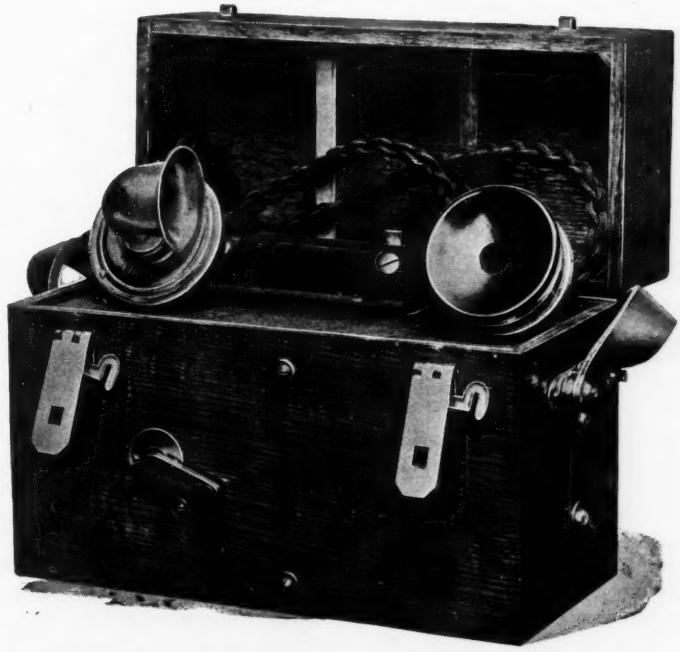


SELF-CONTAINED TELEPHONE SWITCHBOARD CAM AND CLEAR-OUT DROP.

"Motor Speed Regulation," by Alton D. Adams, of Boston.

"Electricity in Mining," by Prof. John Price Jackson, of Pennsylvania State College.

Members from New York city or passing through it, desiring to go by the Fall River steamer "Puritan" from foot of Warren street Sunday, June 25, at 5.30 P.M., should apply to secretary for staterooms during the previous week. The Hotel Brunswick, Boston, will be the institute headquarters. Rooms should be reserved by direct application to the hotel.



STREET RAILWAY TELEPHONE SET FOR USE IN THE WEST INDIES.

An Express Metallic Switchboard.

Improvement in exchange apparatus of telephone companies is always of double importance—it assists the operators and pleases the subscribers. The express metallic switchboard which has been introduced by the Eureka Electric Company, of Chicago, has met with much favor in telephone circles. The quality of the material used in its construction is the highest attainable, and the durability of each part gives long life under the most severe use. Ease of operation is a particular claim of the manufacturers, and the workmanship is certainly to be commended. The number of parts are few, and no periodical adjustment is required. It is a modern type of the self-restoring dropboard, and the manufacturers have reason to be pleased with the welcome it has received throughout the industry. An illustration of the clear-out drop used on this board is presented herewith.

Railway Telephone System in the West Indies.

The West India Electric Company, Limited, of Kingston, Jamaica, have recently ordered telephone apparatus for equipping their street-railway lines with a private plant system, so that connection can be made with the main office from any point along their transmission line of about 25 miles.

The line is provided with junction boxes at intervals where connection can be made with a portable instrument which is carried on a patrol wagon or on the cars.

The portable set used, shown in the illustration herewith, consists of a combination set with generator, buzzer, necessary switch and a pair of pony dry batteries. It is a complete telephone, compactly mounted in a neat case, convenient for carrying, and is provided with a plug and cord for making connection with the various junction boxes. The equipment is made by the Stromberg-Carlson Telephone Manufacturing Company, of Chicago.

The Accident of Birth.

Professor Axenfeld, of Perugia, thinks he has discovered that three-fifths of all men of distinction are first-born children; the other two-fifths are either second or third children, or else the youngest of very large families. Among the first he mentions a number of authors and statesmen; among the last Franklin, a thirteenth child, and Volta, a seventh child. The professor thinks this arises from physiological reasons and a law of nature.

Annual Meeting of the Chicago Edison Company.

The stockholders of the Chicago Edison Company at their annual meeting, on June 12, voted to increase the capital stock of the company from $5,000,000 to $6,000,000. It is understood that only about $500,000 of the new stock will be called for this year. The stock will be issued to present shareholders at par, and the proceeds will be used in liquidating the floating indebtedness of the company and in making certain improvements on the property. The old board of directors was reelected, as follows:

Edward L. Brewster, F. S. Gorton, Samuel Insull, Joseph Leiter, R. T. Lincoln, J. J. Mitchell, Erskine M. Phelps, A. F. Seeberger, Byron L. Smith, A. A. Sprague and Lambert Tree.

President Insull made a brief statement to the stockholders present at the meeting, in the course of which he said:

"Owing to the increase in the company's business, your directors have found it necessary to sell $350,000 of the company's first mortgage bonds during the last year. They deem it, however, desirable that the extensions to permanent plant in the immediate future should be paid for by funds provided by the stockholders, and therefore recommend that the capital stock be increased to $6,000,000.

"The success of the storage battery installed in the Adams street building having been so marked, your directors have ordered that the building be remodeled so as to provide for further battery installation up to a total of 6,000 horse-power.

"During the last year your directors caused the company to guarantee the principal of $223,000 of the bonds of the Chicago Sectional Underground Company, and in consideration the owners of these bonds agreed to accept interest at the rate of four per cent per annum, being a reduction of one per cent.

"The payment of the interest on all the Chicago Sectional Underground Company bonds (but not the principal) was guaranteed by the Chicago Arc Light and Power Company, to whose obligations in that respect this company succeeded upon the consolidation in 1893. There are $37,000 of Chicago Sectional Underground Company bonds still outstanding, on which interest is guaranteed at five per cent per annum, through the consolidation, but their principal is not guaranteed."

At the annual meeting of the stockholders of the Commonwealth Electric Company, which is owned by the Chicago Edison Company, President Insull made the following statement:

"The success of the first year's operation of the company's business leads your directors to expect a steady growth from year to year. One station on the north side, another on the west side, and three on the south side have been shut down, resulting in material economy in the cost of production. During the current year two other stations on the south side will be closed down, and further economies be effected thereby.

"Your directors are constantly increasing the business of the company by occupying territory not supplied heretofore with electric service.

"Since the closing of the books of the company $10,000 additional underlying bonds have been exchanged, so that only $4,000 of these bonds are now outstanding."

A Direct-Reading Volt-Ammeter.

This little instrument is made for the use of those working with ordinary battery currents—amateurs and others—and combines in a single

A DIRECT-READING VOLT-AMMETER.

instrument the functions of a voltmeter and an ammeter. Its range is 20 volts or 15 amperes, and the two scales are in different colors, corresponding with the colors of the binding-posts, so that confusion in connections and readings may be avoided. A mirror behind the scale prevents errors of parallax. The instrument is cased in aluminum and mounted on a mahogany base provided with a leveling screw. Each instrument is carefully standardized before it leaves the factory of its maker, the Ziegler Electric Company, of Boston. The illustration gives an excellent idea of the general appearance of this inexpensive and convenient addition to the experimental laboratory.

To accommodate the rapidly increasing number of subscribers the New York Telephone Company, about July 1, will open a new central office in New York city to be known as "Madison Square." It will serve the territory bounded by Thirty-seventh street, Fifth avenue, Thirty-third street, Seventh avenue, Twenty-fourth street and the East River. A new and improved system of service will be used in the new office.

A Meeting of New England Electrical Supply Dealers.

Representatives of the prominent electrical supply houses of Boston met in that city on June 15 and formed the New England Electrical Supply Dealers' Association. The object is to cooperate with similar associations now in existence in New York, Philadelphia and Chicago, and prospective ones in Pittsburgh, Baltimore and Washington, for the purpose of regulating, on a fair and reasonable basis, prices on electric lighting and electric house-goods supplies. The object is in no sense the formation of a combination, pool or trust. As is generally known the prices of standard goods are below a basis on which even a reasonable business profit may be secured by the supply houses. Such goods as the following will be affected by the proposed arrangement: Sockets, rheostats, switches, speaking tubes, bells, baby knife-switches, batteries, rubber-covered wire in specified sizes up to certain quantities, etc.

The following houses in Boston have joined the association: Bibber-White Company, Pettingell-Andrews Company, C. S. Knowles, Electric Gas Lighting Company, Boston Electric Company, James W. Poole & Company and Anchor Electric Company.

Mr. C. B. Price, of Pettingell-Andrews Company, was elected president; Mr. J. H. Parker, of C. S. Knowles, vice president; Mr. F. W. Cramphorn, of James W. Poole & Company, secretary and treasurer.

The electrical supply houses of Philadelphia, Pittsburgh, Baltimore and Washington have been asked to send delegates to meet representatives of the New York & Boston association at the Astor House, New York city, on June 21, to arrange a schedule of prices on these lines of goods. The plan is to urge these cities to form local organizations similar to the New York, Philadelphia, Boston and Chicago associations, and that these local organizations shall have monthly meetings to discuss prices, arrange current details and insure the maintenance of the agreements.

Some others who are not eligible as members of the association, but were present to express sympathy with the movement, were Mr. George Vallee, of Vallee Brothers & Company, Philadelphia; Mr. H. O. Phillips, of the Phillips Insulated Wire Company, Pawtucket, R. I.; Mr. S. B. Condit, of the Chase-Shawmut Company, Boston; a representative from the Franklin Electrical Supply House, of Philadelphia; Mr. W. W. Low, president of the Electric Appliance Company, of Chicago; Mr. R. Edwards, Jr., of Edwards & Company, New York; Mr. H. T. Paiste, of H. T. Paiste & Company, Philadelphia, and Mr. Babson, of the Boston office of the General Electric Company.

Mr. Charles J. Glidden's Views on the Telephone Situation.

Mr. Charles J. Glidden, president of the Erie Telegraph and Telephone Company, while in New York city last week, said:

"The telephone business in the United States is increasing at a rate which exceeds anything in its history. The subscribers of the Erie system alone are increasing 4,000 a month. I know of no other reason for this remarkable growth than the general business revival throughout the country. I have noticed, however, that the greatest development is along the Pacific coast, in Washington, Oregon and California. Four per cent of the population there have telephones. In proportion to its size San Francisco has more telephones than any other city in the United States. It has over 14,000 instruments, which is five per cent of its population. On this basis New York should have 150,000 instruments.

"The long-distance service now reaches to Galveston, Tex., in the Southwest; Grafton, N. D., in the Northwest; New Orleans in the South, and the extreme northeastern sections of Maine. The extreme points have not yet been put into commercial connection with each other, the direct use at present being confined to distances of 1,500 and 1,800 miles. I think the capacity of the No. 8 copper metallic circuits, now in use is about 2,000. A circuit which would permit of a direct-connection between here and San Francisco would require copper wire at least as large as an ordinary broom handle.

"In the present circumstances I can not see where there is room for any phenomenal developments in the telephone system. Now, if some one would invent a telephone repeater, corresponding to the telegraph repeater, or a telephone quadruplex, corresponding to the telegraph quadruplex, it would revolutionize our business and cut the charges in two for long-distance service. Copper wires would not be necessary then, and the reduction of the cost of maintaining the lines would be enormous. I will give $1,000,000 for either one of these inventions."

Water-Power Electric Plants in the United States.

Mr. B. C. Washington, Jr., of Washington, D. C., read a paper, on June 13, before the Electrical Section of the Franklin Institute, at Philadelphia, entitled "Water-Power Electric Plants in the United States."

He began by giving an historical résumé of the application of water-power for operating machinery, and its rather recent application for driving dynamos. He also spoke of the development of water-wheels from the crude devices of the ancients to those of the present time which have attained the maximum of efficiency. Methods for determining what water-powers should be developed were explained at length, and the wonderful advantages of the electrical transmission of power were fully exploited. Attention was called to the possibility of developing water-powers that are remote from manufacturing or mining centers.

The conditions which regulate the use of different styles of water-wheels and the proper means of connecting them to the generators were also stated. Mention was made of water-wheel governors, and their value for regulating water-wheels when there are variable loads on the generators.

He then stated his views concerning the proper kind of generators to use, and rules to be followed in building transmission lines. With a few remarks relative to insulators and transmission wires, he took up the description of such plants as the Folsom-Sacramento transmission, the New Castle-Sacramento transmission, the Telluride-Mercur transmission, and the Mechanicville-Schenectady transmission. Then followed short descriptions of the equipments of a large number of transmission plants illustrating the various applications of electricity for mechanical purposes.

The subject was fully covered, and profusely illustrated by excellent lantern slides which showed almost the entire hydraulic and electrical equipment of four transmission plants. Sectional and plan views were shown of dams, and these were followed by views of the head-gates, power-houses, water-wheels, water-wheel governors, generators, switchboards, transformers, transmission lines, and substations and their equipments.

Views were shown of vertical and horizontal turbines and impulse wheels, operated singly or in numbers, direct-connected or belted to generators or operating shafting with pulleys and friction clutches.

To cover the applications of electrical power views were shown of electric motors operating mining hoist, mining drill, ore crushers, ore roasters and converters and cotton mill machinery.

Due attention was called to the great value of water-powers, and the fact that many great powers of commercial importance were now allowed to go to waste. He also stated that there were yet fine opportunities for capital to be profitably invested in such developments.

As the result of Mr. Washington's investigations, he stated that there are nearly 500 water-power electric plants in the United States, representing an aggregate investment of over $60,000,000; that the total horse-power represented by water-wheels in these plants is upward of 200,000; that these plants furnish electricity for 28,000 arc lamps; 60,000 horse-power of motors used for manufacturing, mining and other purposes, and besides this supply current for the motors on the cars operated on 610 miles of electric railways.

In conclusion, he stated that the utilization of water-power for generating electricity for transmission has made possible the reduction of low grade ores, and the building up of large manufacturing cities in localities where the enormous cost of steaming coal would have prohibited the establishment of such enterprises.

Dividends.

The Otis Elevator Company has declared a regular quarterly dividend of one and one half per cent on its preferred stock, payable July 15.

The Manhattan Railway Company, of New York city, has declared the regular quarterly dividend of one per cent, payable July 1. Books closed June 16, and reopen July 3.

The Westinghouse Electric and Manufacturing Company has declared a quarterly dividend of one and three-fourths per cent on its preferred stock, payable July 1. Books close June 24; reopen July 3.

The Western Union Telegraph Company has declared the usual quarterly dividend of one and one-fourth per cent, payable July 15, to stock of record June 20. Books closed June 20, and reopen July 5.

The Cincinnati, Ohio, Street Railway Company has declared its regular quarterly dividend of one and one-fourth per cent to stock of record June 18, 1899, payable July 1. The books closed June 17 and will reopen June 22.

Decision on the Carty "Bridging Bell" Telephone Patent.

As announced in the ELECTRICAL REVIEW last week, the United States Circuit Court of Appeals for the third circuit handed down a final decision at Philadelphia, on June 8, in the case of Millheim Electric Telephone Company *et al.*, appellants, vs. Western Electric Company, appellee. The case was tried before Circuit Judges Acheson and Dallas, and District Judge Kirkpatrick, on appeal from the United States Circuit Court for the Western District of Pennsylvania. The opinion of the court was rendered by Judge Kirkpatrick and is, in full, as follows:

The respondents herein, the complainants below, filed their bill of complaint alleging infringement of Letters Patent No. 449,106, granted March 31, 1891, to John J. Carty, and by several assignments duly transferred to the complainants. The defenses set up in the answer were lack of novelty and patentability, prior publication and non-infringement. An examination of the record shows that, prior to the Carty invention, much difficulty had been experienced in communicating telephonically between different stations on a many party line. The difficulty was increased with the number of stations and their distance from each other.

This was due in part to the fact that the stations were as entireties connected on a series system, so that the call generator, the bell-ringer and the voice currents had each to pass in series through each instrument, whereby the energy of the current was dissipated before reaching the distant station, and in part because the lines were electrically unbalanced and subject to serious internal inductive disturbances, as well as from neighboring wires and currents.

To obviate these difficulties Carty discontinued the practice of including the call-sending generator and the call-bell magnets and the telephone serially in the same circuit when calling, and substituted the connection of the said appliances in parallel bridges.

The bell-magnet bridge was equipped with a magnet having a high coefficient of self induction and was normally and permanently closed at all stations. The generator bridge circuit was normally open but adapted to be closed when sending a call. The connection of the telephone in a third bridge circuit at each station was normally open but capable of being closed in multiple with its own bell-magnet circuit and the bell-magnet circuits of all the other stations when in use.

The practical result was that when the call-bell generator was closed and put in connection with the main line circuit, the low-frequency current of the call-bell short-circuited through the bell-magnets and the bells were rung at all stations, including the home station. The call-bell generator circuit was then opened and disconnected. The telephone circuits between the two stations, desiring to communicate, were then closed and thereby put in multiple with each other and the call-bell magnets' circuit. But while the telephone circuits were so in multiple with the bell-magnet circuits, *yet* the high-impedance magnets in the bell-magnet circuits rendered these last named circuits opaque to the high-frequency voice currents of the telephone and enabled them to be transmitted, undiminished, over their own low-impedance circuit to the receiver with which they were in connection.

By this combination of devices Carty obtained the effect of two distinct and separate circuits, one of which was adapted to the low-frequency currents of the bell generator and the other to the high-frequency voice currents of the telephone. It also had the effect of electrically balancing the lines and thereby reducing to a minimum the annoyances of induction which had so seriously interfered with the usefulness of the old system.

So far as the record shows, there was no anticipation of this device. All the elements of the combination had been used before and the functions of each were well known in the art, but it does not appear that they had ever been similarly specifically combined for effectuating the purpose here accomplished. The grant of the patent carries with it the presumption of patentability, and this presumption has been strengthened by the general acceptance of the device, the acquiescence of those skilled in the art and their willingness to accept licenses thereunder.

We have carefully considered the questions of prior publication and anticipation. The differences between the patent in suit and those cited as most nearly approaching the Carty device have been fully and particularly set out in the opinion of the learned judge below.

We fully concur in his conclusions and refrain from drawing the distinctions, lest we should but repeat what he has so clearly expressed.

Infringement is charged in the bill and not denied except in the unverified answer. Complainants' witness after examination of defendants' system, testified that it was constructed and organized completely in accordance with the instructions contained in the patent in suit. Though these facts were peculiarly within their own knowledge the defendants offered no contradictory evidence bearing on the question.

We are of opinion that the patent is valid and infringed. The decree of the Circuit Court will be affirmed.

A Prophet Ariseth!

TO THE EDITOR OF ELECTRICAL REVIEW.

I am trying to bring out what electricity is doing in the world. You have observed in the papers that the steamer "Paris" is empaled on the rocks off the coast of England. By applying electricity to the case, I see that Monday morning, June 5, about 11.30 A. M., England (6.30 here), a westerly wind will blow, the bells ring, the whistles blow, and the triumphant shout will go up: "She moves! She moves!" and the noble ship will float off from the rocks on which she has been lying for two weeks and one day.

Of course, men will say, I did this, or I did that, and the ship floated. But I say it was put on the rocks by electricity, and will be lifted off by the same force.

Forecast of the New York Stock Market for the week commencing June 5 to the 10: I am sorry to say the big men are going to let the bears have their own way all week, with the exceptions of some small rallies. Please take note that on June 29–30 the *hot* wave of electricity for the year will pass over the country. (For comparison only.)

Very respectfully yours,

JOHN W. BARRETT.

Poughkeepsie, N. Y., May 29.

ELECTRICITY IN A NAVAL MACHINE SHOP.

THE NEW ELECTRICALLY OPERATED STEAM ENGINEERING PLANT TO BE ERECTED AT THE NEW YORK NAVY YARD, BROOKLYN, N. Y.

The United States Navy Department has prepared plans for an extensive electrically operated engineering shop, to be erected as an adjunct to the already large government plant at the New York Navy Yard, in the borough of Brooklyn, of which mention was made in last week's ELECTRICAL REVIEW.

This plant will be one of the most notable electrically operated shops in the country and, for a government undertaking, marks a conspicuously promising state of advancement.

As a power plant for manufacturing purposes alone, it is a very large undertaking. The additional fact of every tool being electrically operated makes the undertaking a very interesting one; and that all the motors are to be operated on the alternating two-phase plan will make the plant unique.

A conservative element in the undertaking will be noticed in the use of natural draft solely; another noticeable feature will be introduced in a vacuum-heating system, in which the steam pressure is limited to eight pounds above absolute vacuum.

Provision is to be made for regular economic tests of coal, steam and current consumption, and these, if made public, will be of great interest. The requirements for economical working are very stringent.

The following is a description of the plant and the equipment required. A call for bids will soon be sent out. The plant must be completed within 12 months from the date of the contract:

The main shops occupy a rectangle 342 by 470 feet, containing a machine shop, erecting shop, smith shop, testing room and copper shop, tool room, boiler room and power house. In addition to the main shop, there will be a foundry, 110 by 342 feet, a pattern shop and an administration building. The equipment will be as follows: A steam plant, to consist of three 400-horse-power water-tube boilers, fitted with automatic stokers, coal storage and coal conveyors. Two feed-water pumps are to be supplied, one to be steam-driven and one, for regular service, to be electrically operated. An economizer will be installed and a smoke stack, 150 feet high, will be erected of a sufficient capacity. Three feed-water heaters will be used, one to take steam direct from the receiver of the generating engine.

The power equipment will consist of three 600-horse-power, vertical, cross compound, condensing engines, with the corresponding generators arranged on the shaft between the two parts of the engine. The engines are to have the high-pressure cylinder jacketed and a reheater placed in the receiver. The air and circulating pumps are to be electrically operated. Water for the condensers will be taken from the East River. A hand power crane will be put in place over the engines.

Economy of Working—The engines are to have a phase-angle displacement not to exceed one-tenth of one degree, and a regulation within two per cent. The steam consumption must not exceed 21 pounds of dry steam at 160 pounds pressure for each kilowatt delivered at the switchboard when working at the rated capacity of the generator. At one-half load a consumption of 26 pounds of steam per kilowatt will be permitted. The steam consumption includes the steam used in the feed-water heaters.

A guaranteed economy of two and one-tenth pounds of coal per kilowatt delivered at the switchboard at the rated capacity of the generators will be required.

The plant is to be arranged throughout for economic tests in coal and steam consumption and electrical output.

Electrical Plant — The electrical plant will consist of three 400-kilowatt direct-connected generators, supplying alternating current at 220 volts' two-phase, 25 cycles, to correspond with the other Brooklyn systems. The electrical regulation of the generators must be within five per cent. The generators must be constructed to work in parallel.

Two exciters will be provided, each of a capacity to supply excitation to two of the 400-kilowatt generators. One of the exciters is to be electrically driven for regular service, and one is to be steam driven as an auxiliary. A complete modern switchboard will be installed, with a full equipment of instruments.

Motors — A complete system of motor-driven machinery will be installed. Each tool requiring more than five horse-power will have an independent motor equipment, while tools requiring less than five horse-power will be grouped and run from a line shaft driven by a 12-pole, 10-horse-power motor.

The greater number of motors will be of the constant speed type, but some of variable speed will be required. Thirteen electric cranes will be installed in the various shops. The lighting is not included in this equipment.

Heating, etc.—The heating of the buildings will be on the exhaust system, with a pressure not to exceed eight pounds of steam above absolute vacuum. The ventilating will be done with blowers by means of which warm or cool air will be distributed. Air compressors will be installed to operate pneumatic tools. A fuel-gas plant will be installed to supply the forges.

The government aims to make this plant one of the most economical in operation, and only the best apparatus of its class will become part of the equipment. The specifications were drawn up by Engineer-in-chief G. W. Melville, than whom no one favors more the use of electrical methods.

The Riker Electric Vehicle Company.

The Riker Electric Vehicle Company has been incorporated under the laws of New Jersey, with a capital of $2,000,000, six per cent non-cumulative preferred and $5,000,000 common stock. The company will purchase for cash all patents, machinery, contracts and rights of Andrew L. Riker and the Riker Electric Motor Company for the manufacture of electric vehicles. It will purchase extensive works at Elizabethport, N. J., which have a present capacity of five complete vehicles per day. Among those interested in the company are Andrew L. Riker, Charles A. Lieb, president of the Great Falls Power Company, of Washington; O. T. Crosby, president of the Washington street railways, and F. C. Stevens, president of the West End Bank, Washington.

A New Directory.

The E. L. Powers Company, of New York city, have effected an arrangement for the publication of the future issues of the *Electric Railroad List of the World*, formerly published by the *Railroad Gazette*, of New York. The publication will be consolidated with the *American Street Railway Directory*, under which, or a similar name, it will hereafter appear. By means of this consolidation the directory will have the combined circulation of both directories, its scope enlarged and its data improved in point of accuracy and completeness.

ELECTRIC RAILWAY NOTES.

It was rumored in Wall street last week that the Fifth avenue elevated line of the Brooklyn, N. Y., Rapid Transit system would be ready for operation by electricity by June 25.

The Oswego, N. Y., Street Railway is now in possession of and controlled by the bondholders' reorganization committee, consisting of Charles T. Barney, of New York; Max B. Richardson and C. Sidney Shepard.

The United States Circuit Court, at Philadelphia, has ordered that Wm. B. Given, the receiver of the Pennsylvania Traction Company, of Lancaster, Pa., shall sell all the property of the company on October 11, 1899.

A controlling interest in the Framingham Union Street Railway Company, operating trolley lines between South Framingham and Framingham, Mass., has been sold to a syndicate controlled by Willard B. Ferguson and James F. Shaw & Company.

The reorganized Niagara Gorge Railroad Company has elected the following directors: Gen. Francis V. Greene, Herbert P. Bissell, Capt. Joseph T. Jones, Edward W. Eames, William C. Cornwell, Clarence M. Bushnell, Avery D. Andrews, J. Henry Metcalf, Bert L. Jones, Herbert H. Hewitt and George V. Turner, of New York city. The officers elected for the first year are president, Gen. F. V. Greene; vice-president, Herbert P. Bissell; secretary, Herbert H. Hewitt; treasurer, Bert L. Jones. The officers have named Godfrey M. Morgan, of New York city, to be general manager, and George A. Ricker has been appointed chief engineer.

Planked Shad for Electricians.

Mr. C. E. Trump, president of the Novelty Electrical Works, gave his annual planked shad dinner, June 7, at Washington Park on the Delaware River, below Philadelphia. Guests were present from New York city, and a few of Mr. Trump's friends, of Philadelphia, were also included in the very delightful affair. Planked shad were specially provided for the occasion, and the appetites of all were equal to several rounds. A number of new and genuinely good after-dinner stories were told the visitors from Manhattan, who, since their return, have been posing as raconteurs of great originality and imagination, but it is best to record here that to Mr. Trump belongs the first credit.

These annual outings are anticipated with a great deal of zest by the privileged few who are invited, and the realization is always of the pleasantest kind.

Experiments with the Caldwell Interrupter.

The subjoined letter was sent to the London *Electrical Review* by Mr. A. G. Cooke, the head of the Physics and Electrical Engineering Department of the Battersea Polytechnic.

One of the most striking phenomena exhibited by this apparatus, and which may give the key to the explanation of the action which goes on at the point of interruption, is the way in which the acid is drawn through the orifice from one vessel to the other under certain conditions.

In these experiments the interrupter was constructed as follows: A large vessel filled with strong acid contained one electrode; a glass tube of one-half-inch internal diameter containing the second electrode was placed in the larger vessel, the tube having orifices of various size and shape. In almost all cases the acid was drawn rapidly through the orifice, and rose to considerable height in the tube above the level in the larger containing vessel.

This rise in the inner vessel did not appear to be affected by the direction of the current. It increased very rapidly with the electro-motive force employed, the following giving the mean of several measurements with an aperture of about 1.5 millimetres diameter in the extremity of the one-half-inch tubing. Very consistent results were not obtainable, nor would exactitude be of any value, as very slight alteration of the conditions, to be explained later, greatly modified them.

Electro-motive force.	Current.	Rise in centimetres.
55	2.5	1.5
75	3	10
95	3.5	25
110	4	50
130	4	90

These results were obtained when a six-inch spark induction coil was placed in series with the interrupter. When this coil was removed, the rise, as also the frequency, was somewhat reduced. But with the much greater inductance of a transformer in series, both the frequency and the rise were also greatly reduced.

During prolonged working the orifice gradually increased in size in a very curious manner, the edges appearing as if ground away, and an irregular orifice becoming perfectly circular. The increase in size naturally increased the current, while the frequency was reduced. The frequency also increased somewhat as the acid rose in the tube.

The size of the orifice did not appear to greatly affect the rise in the tube, though a great many were tried up to a diameter of two millimetres, nor did it seem to matter much whether the orifice was in the side or extremity of the tube. An attempt to use a J-shaped tube resulted in the acid being drawn downward initially as easily as upward, but the collection of steam beyond the bend soon broke the circuit and produced frequent small explosions. The approach of a piece of glass close to the orifice externally reduced the rise in the tube. An orifice at the end of a tube drawn out to a slightly conical shape gave a very great rise, but on cutting off this cone, and fusing it into another piece of the tube so as to obtain an inward pointed cone with the minute orifice at the end, I succeeded in reversing my previous results and causing the acid to be drawn out of the inner vessel into the outer. Even then, however, if I caused the acid to rise a few inches into the inner tube by deeper sinking, it would continue to rise still further; but if I brought the end of the tube near the bottom of the outer vessel the acid was again sucked out. It seemed, therefore, that the acid would be drawn into the vessel which most obstructed its free flow from the orifice.

My results appear to be very naturally explained in accordance with the hypothesis suggested by Mr. C. T. Child, in this week's ELECTRICAL REVIEW, in the following way: "Supposing that the contraction of the surfaces of the acid, when separated by the bubble of steam in the orifice, is much more rapid than the separation during the formation of the bubble, the acid will be forced outward from the orifice more or less equally into either vessel, while the more sudden flow of contraction will be modified by the inertia of the acid. From the one vessel, generally the inner or smaller, a larger amount of momentum has to be imparted to produce the requisite flow, and the place of the ejected bubble will be filled mainly with acid from the vessel into which the lines of flow spread out most rapidly, generally the outer. Thus the acid will advance with successive impulses into the inner vessel, until the increased pressure causes the expansion of the bubble to push the acid outwards only. Any blocking of the free access of the acid externally causes a reduced inward flow, while, as in the last experiment above, a longer column of acid in the tube increases the momentum of the acid when ejecting the bubble, and thus causes an inflow.

"This theory was further confirmed by placing a large test tube in the outer vessel, and the orifice tube was sunk into the test tube. The latter vibrated as if attracted and repelled with each interruption, beating upon the bottom of the outer vessel."

Another Advantage of the Electric Railway.

[*From the Four Corners, Rochester, N. Y.*]

Did it ever occur to the reader that extension of street railway lines into the outlying districts of a city is repressive of crime? More crime comes from thickly populated districts than from thin settlements, where people watch each other—in other words, know each others business, and keep tabs on each other—a sort of private police system. This can not be done in the crowded portions of the city, where many misdemeanors can be enacted without attracting attention. This idea the reader can elaborate to his heart's content It doesn't follow that you can not be good in the central portion of the city, but it's better to get where Miranda's eyes keep you in the straight and narrow path.

Wall Street and the Electrical Stock Market.

Speculation in the stock market during the week just closed was quiet and rather unsettled. A slight decline was noted in the better class of stocks, especially the Granger group, which was not unexpected in view of the crop outlook.

On the New York Stock Exchange General Electric closed the week at 117 bid and 118 asked, a loss of 1⅝ points during the week. Metropolitan Street Railway of New York closed at 226 bid and 226½ asked, a loss of 3 points for the week. Third Avenue Railroad of New York closed at 190 bid and 200 asked, a gain of 8 points for the week.

On the Philadelphia exchange Electric Storage Battery common closed at 134 bid and 137 asked, a loss of 3 points for the week. Union Traction closed at 42⅛ bid and 42¼ asked, a loss of ⅞ of a point for the week.

On the curb or outside market in New York Electric Vehicle closed at 104 bid and 110 asked, a loss of 6 points for the week. Electric Boat closed at 21 bid and 24 asked, indicating no change for the week.

Wall Street, June 17.

A Lay of the Mains.

The boilers take their toll of care; in steam-pipes there are joints;
The engines need an overhaul at times;
The dynamos, the darlings, have their awkward little points;
And the switchboard is not innocent of crimes.
But the chaps that take the biscuit, O! the boys that take the bun,
Are the cables that lie buried in the street;
For you never know the moment when they'll have their bit of fun;
You never know what's brewing 'neath your feet.

The boilers are in duplicate, the steam-pipes are a ring;
The engines, you may read their souls aright;
The dynamos—God bless them!—can't complete their little fling,
Like the switchboard, you have got them all in sight.
But the feeders near the station and the mains that spread for miles
They are free to have their little bit of sport.
Who thinks he knows his mains by heart, he recks not *all* their wiles,
And Heaven only knows what caused the short.

Sometimes a boiler bursts a tube; a steam-pipe joint will blow;
An errant nut will give a piston pause;
An armature conductor will a drunken winder show;
And a wrench behind the switchboard be the cause
Of hairpins on the circuit till the spares have turned the tide.
But let the spider's web begin its game—
An acre is the station, to a few square leagues outside;
And the difference in effect is just the same.'

A cable may be perfect, and a careful laid one, too;
Its jointer may be all he claims, and more;
But the man who runs the cable, be it old or be it new,
Will learn to dread the hurried knock at door.
So, till the joyful time arrives when navvies work with care,
And angels heal the spot that wants to arc,
O! let the harassed mains-man have your morn and evening prayer,
That consumers mayn't be swearing in the dark.

J. H. C. B., *in the Electrical Engineer.*

Hot Weather Compliments for a Street Railway Company.

A newspaper in a Pennsylvania city passes the time o' day with the local street railway company, as follows:

If there is a meaner corporation on the face of the earth than the —— Railway Company, we are glad we know nothing of it, for the depth, height, breadth and circumference of its disreputableness as a public servant so far surpasses the limits of decency, that anything that would go further wrong would simply be an unmitigated evil.

Take its rolling stock, for example. With the exception of the large cars, which Mr. —— prefers to have called "passenger coaches," almost the whole outfit is out of repair in some way or another. Much of it was second-hand when it came here, and today not a few of the cars are totally unfit for service. The flat wheels of —— cars are proverbial, and are not only a source of great discomfort to passengers, who are compelled to ride over them, but are also a source of annoyance to every resident along the line of travel.

The Creighton, Neb., Electric Light Company will change from steam to water-power, and also enlarge its plant.

ADVANCE INFORMATION

New Electric Railways.

HARRISBURG, PA.—A charter has been issued to the Springfield Street Railway Company, of Delaware County, with a capital of $75,000, to connect lines already established.

BRISTOL, R. I.—Barrington, Warren & Bristol Street Railway Company, operating an electric road in the towns of Barrington, Warren and Bristol; capital, $500,000; incorporators, Orrin S. Anthony, Drownville; Chas. H. Hand, Chas. B. Rockwell, A. T. Potter, Benjamin F. Mainer, Jr., all of Providence. On May 26, 1899, the above charter was amended by the legislature so that if the company shall fail to file an application for a location of the road within six months of the passage of the act of amendment, or shall fail to build or complete the railway within two years after the location of the road has been fixed by the town councils, the original charter of the company shall be void.

ELMIRA, N. Y.—The Elmira & Corning Electric Street Railway Company has been incorporated, with a capital stock of $20,000, fully paid. The company proposes to build a surface electric railway, a distance of 18 miles, from Elmira to Corning.

TORONTO, ONT.—A charter has been granted to the Sao Paulo Railway, Light and Power Company, Limited, of which Wm. Mackenzie, James Gunn and others are the promoters. The share capital of the company is $6,000,000, and the powers of the company are chiefly in connection with acquiring and constructing railway and similar works outside of the Dominion of Canada.

ANNAPOLIS, MD.—The Potomac & Severn Electric Railway Company has been incorporated, to build a road through the streets of Annapolis and on to the eastern boundary of the District of Columbia.

HAGERSTOWN, MD.—The Hagerstown & Frederick Railway Company has been incorporated, with a capital stock of $200,000. It will build an electric road from Hagerstown to Myersville, to connect with the road to Frederick at that point.

OSWEGO, N. Y.—The title of the Oswego Street Railway Company has been changed to that of the Oswego Traction Company. The capital stock is $300,000. The directors are S. M. Coon, D. B. Page, C. A. Tanner, R. Arthur Downey, Daniel A. Williams and Max B. Richardson, of Oswego; George Turnbull and Charles C. Crook, of New York, and C. Sidney Shepard, of New Haven, N. Y.

GALATEA, OHIO—John J. Geghan, of Toledo, will build an electric railway from North Baltimore to Galatea, a distance of three miles.

COLUMBUS, OHIO—John A. Mehling, a New York capitalist, has been here for the purpose of interesting local investors to take stock in a new electric line between this city and Zanesville. The company will have a capital stock of $6,000,000.

Electric Light and Power.

DENVER, COLO.—The People's Arc Lighting Company, capital $25,000. The incorporators are Albert Finger, Henry Miller, Joe Lustin, Leonidas Fletcher and H. C. Joyce. The purpose is to "furnish all kinds and classes of light."

CAMDEN, N. J.—York Light, Heat and Power Company, capital $350,000; incorporators, Charles C. Frick, Frank R. Hansell, John H. Cromie, Jr.

EAST ORANGE, N. J.—The Merchants' Electric Light and Power Company. The capital stock is $125,000, of which $8,475 is paid up. The incorporators are Walter Ross, W. A. Hinebough, C. F. Gasser, E. C. Dyers and C. B. McCoy.

ROCKAWAY, N. J.—The Rockaway Electric Light and Improvement Company has started to receive subscriptions for stock at $10 per share. The sale of stock will close at noon July 3. The capital stock is fixed at $15,000.

CAMDEN, N. J.—The Wildwood, Holly Beach & Anglesea Electric Light, Heat & Power Company has been incorporated. The capital stock of the company is $30,000 and the amount paid in is $2,000. The corporators are Spencer Simpson, Haddonfield; P. W. Wiltbank, this city, and John M. Mays, of Philadelphia.

ROGERSVILLE, PA.—Rogersville Electric Company. Manufacturing electric light and motive power; capital, $5,000; incorporators: C. C. Cochran, A. B. Rogan, S. Webster, J. T. Anderson, A. D. Huffmarter, R. H. Spray, all of Rogersville.

NEW BRITAIN, CT.—The Stanley & Hart Power Company has been incorporated. The incorporators named are W. H. Hart, L. Hoyt Pease, G. P. Hart, F. N. Stanley and E. Allen Moore. The capital is $50,000, and may be increased to $200,000.

DECATUR, ILL.—John Allen is the chief promoter of a new electric light and power company, to be established in Decatur, to compete with the Decatur Gas and Electric Company, which lately absorbed the Municipal Light Company.

HARPER'S FERRY, W. VA.—John M. Livers will erect a $10,000 electric light plant for Shepherdstown Electric Light and Power Company.

COLUMBUS, WIS.—The council has decided to make contracts with Ide & Company for two 65-horse-power engines, with the Westinghouse company for two dynamos, and with the Electrical Supply Company, of Madison, for the construction of its electric light pole line complete, the cost to be $10,000.

New Telephone and Telegraph Companies.

CLATONIA, NEB.—Clatonia Telephone Company; capital, $5,000; incorporators, S. Borkey, F. W. Jones, J. H. Steinmeyer, H. H. Jones, H. Albert, all of Clatonia.

NOBLESVILLE, IND.—The Home Telephone Company has been incorporated, with a capital of $5,000.

EVELETH, MINN.—Mesaba Telephone Company; capital, $25,000; incorporators, C. W. More, F. C. Talboys, of Eveleth; O. D. Kinney, G. W. Buck, W. Harrison, of Duluth.

CHESTERFIELD, VA.—The Chesterfield & Powhatan Telephone Company has applied for a charter at Chesterfield Courthouse. The chartered members of the company are the following: Messrs. A. L. Adamson, B. T. Watkins, W. W. Baker, R. A. Justice, J. B. Watkins, J. B. Fisher, W. P. Fields, P. B. Cogbill, M. A. Cogbill, H. P. Justis, James Nelson, L. P. Hill, J. A. Spears, A. J. Eastman. Officers for the first year are president, W. W. Baker; vice-president, J. B. Fisher; treasurer, B. T. Watkins; secretary, W. P. Fields. Directors, A. L. Adamson, R. A. Justis, P. V. Cogbill, M. A. Cogbill, J. Nelson, J. B. Watkins, L. P. Hill and the officers.

FRANKFORT, KY.—Anderson County Telephone Company; capital, $12,000. The chief stockholders are J. J. Downey, of Cincinnati, and C. P. and E. T. Johnson, of Lawrenceburg.

HOUSTON, TEX.—The Citizens' Telephone Company, of Texas, with principal place of business at Houston, Tex.; capital stock, $100,000; incorporated by A. L. Waterbury, E. A. Glass, F. C. Bogart, W. G. Lears, of Houston, and W. Bucklin, Jr., of Marble Rock, Iowa.

WHEELING, W. VA.—National Telephone Company, of West Virginia; capital, $150,000; incorporators, A. G. Steelman, I. H. Shirk, H. M. Buck, J. B. H. Jefferson, E. L. Ward, all of Baltimore, Md.

NORTH TONAWANDA, N. Y.—The Twin City Telephone Company has been incorporated with a capital of $40,000, divided into 1,600 shares of $25 each. The general route and points to be connected are as follows: North Tonawanda to Buffalo, North Tonawanda to Lockport and to Niagara Falls; also to connect other points in the counties of Erie and Niagara. The directors are J. H. Barnard, C. I. Watson, William A. Gardei, Charles H. Scoville, of Tonawanda; M. J. Wattengel, of North Tonawanda, and G. A. Currier, of Buffalo.

GATESVILLE, TEX.—The Gatesville Telephone Company, capital $5,000, has filed its charter.

PERTH AMBOY, N. J.—The Amboy Telephone Company, capital $10,000; incorporators, Andrew Dingler, Jersey City; Richard S. Bowen, Harrison, N. J.; Samuel A. Boyd, Brooklyn, N. Y.

New Incorporations.

JERSEY CITY, N. J.—Caracas Construction Company, principal office, the Corporation Trust Company Building, Jersey City, N. J., erect works to supply electricity for light, etc.; capital, $1,750,000; incorporators, John C. Tomlinson, Rafael R. Govin, N. T. M. Melliss.

DOVER, N. J.—Miners' Electric Refining Company; capital, $500,000; incorporators, A. R. Ferguson, A. T. Herd, J. P. McGovern, New York.

PORTLAND, ME. — International Electric Mining Company; capital, $500,000; incorporators, G. D. Burton, S. Butler, M. V. Livingston, Boston; O. P. Adams, Cambridgeport, Mass.; H. S. Cram, Portland, Me.; A. W. Steiner, S. W. Low, C. F. Adams, Brooklyn.

NORFOLK, VA.—Washington Traction and Electric Company, manufacturing and dealing in railroad supplies, etc.; capital, $12,000,000; incorporators, Samuel B. Lawrence, Henry M. Haviland, George E. Spencer, John B. Summerfield, all of New York city; James W. Wilcox, Norfolk.

TRENTON, N. J.—Grav-Electric Clock Company to manufacture electric clocks; capital, $500,000.

PIERRE, S. D.—Articles of incorporation have been filed for the Ulster County Battery, Chemical Light, Heat and Power Company, with a capital of $250,000; incorporators, William A. Tubbs, Alfred B. Dunn and G. V. Pattison. The Green County Chemical Battery, Light, Heat and Power Company, with a capital of $100,000; incorporators, William A. Tubbs, Alfred B. Dunn and G. V. Pattison. The Columbia County Chemical Battery, Chemical Light, Heat and Power Company, with a capital of $150,000; incorporators, William A Tubbs, Alfred B. Dunn and G. V. Pattison. The Delaware County Chemical Battery, Light, Heat and Power Company, with a capital of $150,000; incorporators, William A. Tubbs, Alfred B. Dunn and G. V. Pattison.

Increase of Capital.

SHARON, CT.—The Sharon Telephone Company has increased its capital from $7,000 to $10,000, 20 per cent paid in.

CHICAGO, ILL.—The Chicago Telephone Company's directors have ordered the sale of $663,500 treasury stock, which makes the amount outstanding up to the full authorized limit—$5,000,000.

CHICAGO, ILL.—The Chicago City Railway, which will put out an additional $1,000,000 of stock July 1. This increase is only one-half of the amount authorized by the stockholders, and the rest will be held back till the necessities of the business require its sale.

CHICAGO, ILL. — The Chicago Edison Company has increased its capital stock $1,000,000.